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WAR MACHINE

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The Sturmgeschütz in Action   Guns of the Allies   German 'Lash-ups'

A fully illustrated guide to Self-Propelled Guns of World War II

WAR MACHINE

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Editorial Offices
War Machine
Aerospace Publishing Ltd
179 Dalling Road
London W6 0ES

Managing Editor: Stan Morse
Editorial: Trisha Palmer
Chris Bishop
Chris Chant
Ian Drury

Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon

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Film work: Precise Litho Ltd

Artists:
Ray Hutchins
Peter Sarson & Tony Bryan
Terry Hadler

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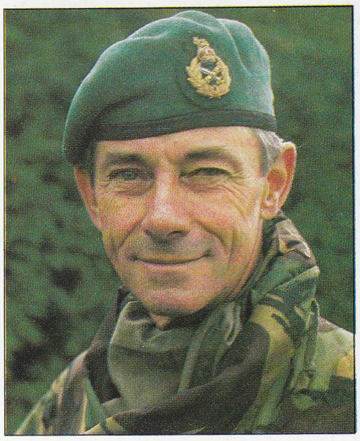
Subscription Manager: Christine Allen
0488 72666



Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

Distribution and marketing offices:
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Telephone: 01-379 6711

Circulation Director: David Breed
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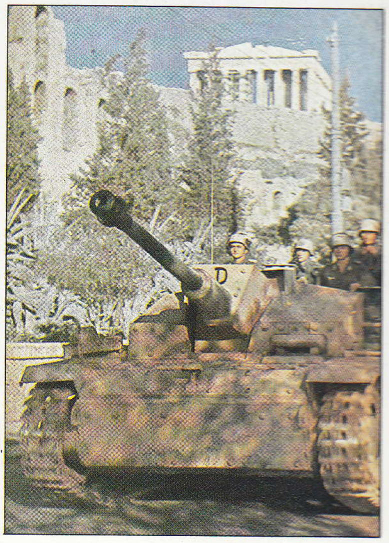
Self-Propelled Guns of World War 11

Once Germany had demonstrated the new pace of armoured warfare, most belligerent nations began to develop fully mechanized divisions. Field guns were mounted on tank chassis and a new generation of armoured fighting vehicles was born. Self-propelled guns assumed ever-increasing importance during the war, and today have largely supplanted towed artillery.



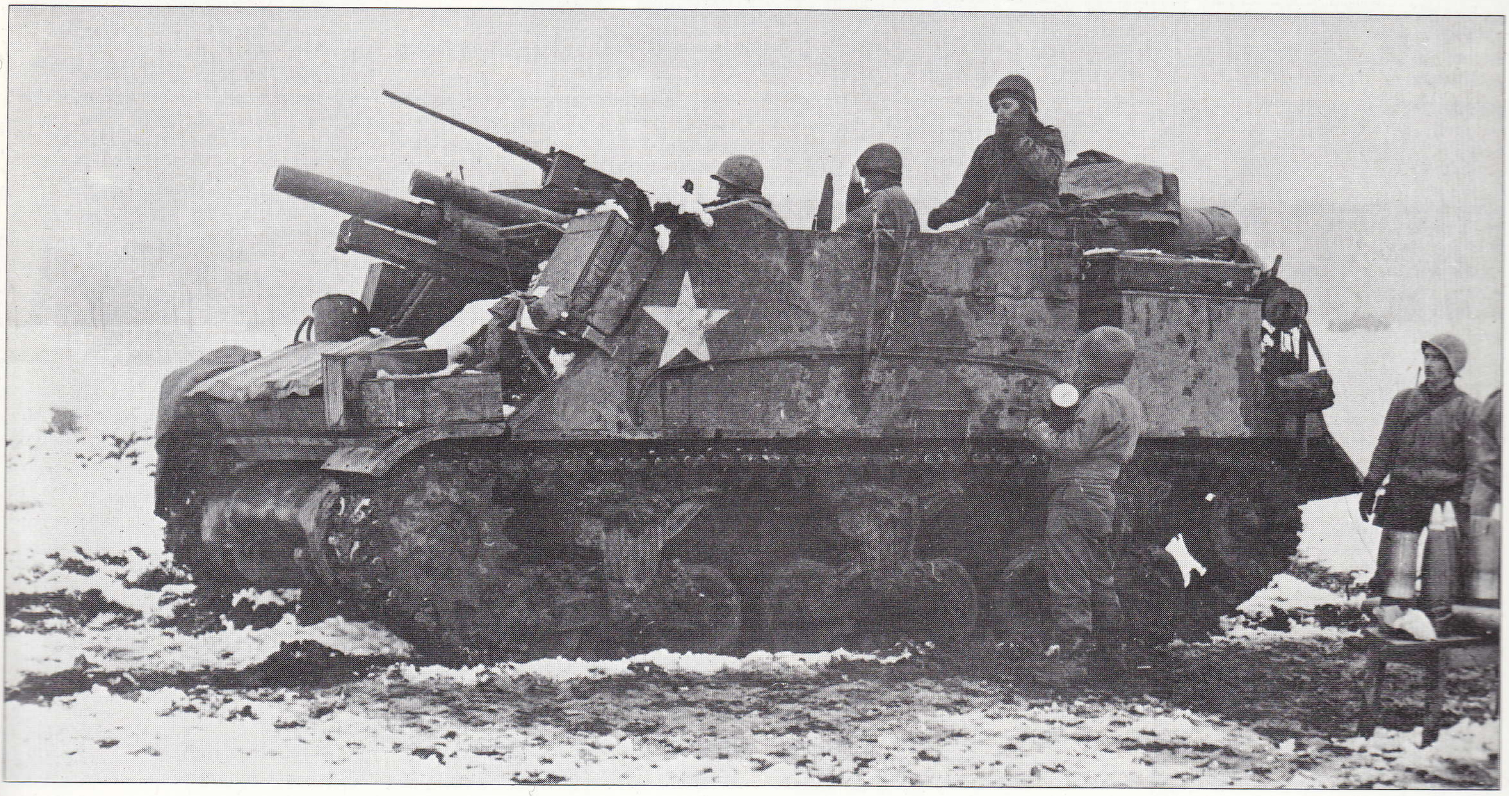
Arguably the most famous self-propelled gun of World War II was the Sturmgeschütz III. Entering service in 1940, it served throughout the war in a bewildering multitude of variants, but its aggressive low silhouette often led to its being employed as a cut-price tank.

Self-propelled artillery was very much a product of the type of warfare that evolved during World War II: before 1939 self-propelled artillery scarcely existed (apart from a few trial weapons), but by 1943 it was used by all the combatant nations. The sudden rise of this new form of weapon can be attributed almost entirely to the impact of the battle tank on tactics, for warfare no longer took place at the speed of the marching soldier and the scouting horse, but at the speed of the tank. Tanks swarmed all over Poland, France and eventually the Soviet Union, and the only way that the supporting arms, including the artillery, could keep up with them was to become equally mobile.

Many of the early self-propelled artillery platforms were simply conversions of existing tanks to mount artillery pieces, but the measure of conversion varied widely. Some were scarcely more than 'lash-ups' to meet a hasty requirement or built locally to suit a particular task. Others were carefully designed from the outset and may be regarded as virtually new products. But two distinct trends can be discerned in the way self-propelled artillery was used in action. One school regarded mobile artillery as a simple adjunct to existing artillery doctrines, and this school designed and used the self-propelled platforms to deliver indirect supporting fire in the usual way. The other school regarded the mobile gun as a form of close-range direct-fire weapon to be used in close support of armour, and this school was responsible for the assault gun. Today both types of weapon are extant, but the modern accent is on the indirect-fire weapon in the West and the close-support assault gun in the East.

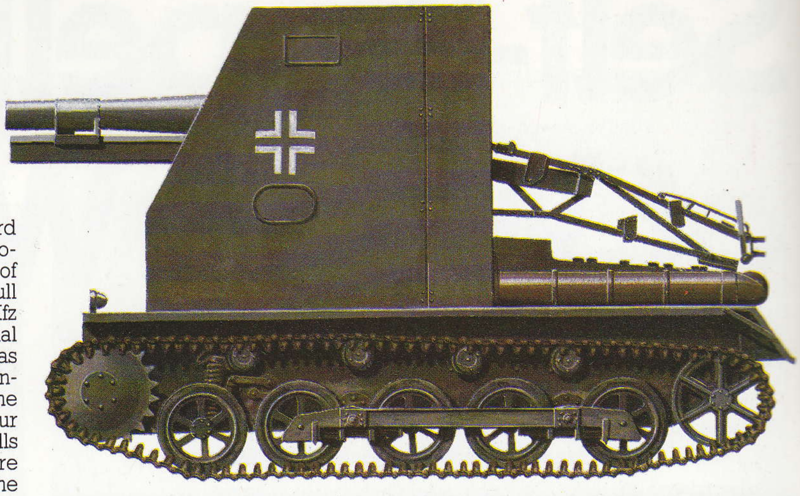
Only a selection of the many types of self-propelled artillery that proliferated between 1939 and 1945 can be found in this study. Some important types have been omitted, while some 'one-offs' have been included to demonstrate the variety of design concepts that were attempted. The number and approaches of the different designs came to be enormous before 1945, but only relatively few models actually found their way into action. Most of them are covered here.

An M7 is seen in action 'somewhere in Europe' during the harsh winter of 1944-5. This vehicle is typical of the period, being liberally cluttered with extra equipment and ration packs, but the AA machine-gun is manned and the crew are well protected against the weather as they serve the 105-mm (4.1-in) howitzer.



GERMANY

sIG 33 auf Geschützwagen



One of the first German self-propelled conversions was the mounting of a 15-cm sIG 33 infantry howitzer onto the hull of a PzKpfw I light tank.

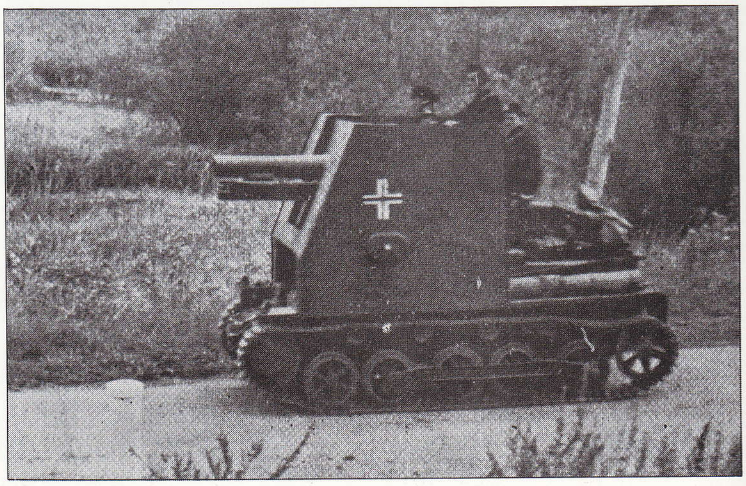
The German infantry battalions each had a small artillery complement of four 7.5-cm (2.95-in) light howitzers and two 15-cm (5.9-in) infantry howitzers for their own local fire support. The 15-cm howitzer was known as the schwere Infantrie Geschütz 33 (sIG 33, or heavy infantry gun) and was a very useful and versatile weapon, but it was heavy and the only 'equipment' allocated to most infantry formations for the movement of the weapons were horse teams. Thus when an increasing degree of mechanization began to filter through the German army the sIG 33 was high on the list for consideration.

The first form of mobile sIG 33 was used during the French campaign of May 1940. It was one of the simplest and most basic of all the German self-propelled equipments, for it consisted of nothing more than a sIG 33 mounted complete with carriage and wheels on to a turretless PzKpfw I light tank as the **15-cm sIG 33 auf Geschützwagen I Ausf B**. Armoured shields were provided for the crew of four, and that was that. It was not a very satisfactory conversion as the centre of gravity was rather high and the chassis was overloaded. Moreover, the armour protection was not good, and so in 1942 the PzKpfw II was the subject for conversion. This **15-cm sIG 33 auf Geschützwagen II ausf C SdKfz 121** conversion had the howitzer mounted low in the chassis, and was so successful that during 1943 a version with a lengthened hull was produced as the **15-cm sIG 33 auf Fgst PzKpfw II (Sf) Verlänget**.

The ex-Czech PzKpfw 38(t) was also converted to act as a sIG 33 carrier. In 1942 the first of a series of vehicles known collectively as the **15-cm sIG 33 (Sf) auf PzKpfw 38(t) Bison SdKfz 138** were produced. The first series had the sIG 33 mounted forward on the hull top behind an open armoured superstructure, and this weapon/vehicle arrangement proved to be so successful that it was formalized in 1943 by the production of a new version. This was a factory-produced model rather than a conversion of existing tanks and had the vehicle engine mounted forward (instead of at the rear as originally located) this entailing the movement of the fighting compartment to the hull rear. This was the **SdKfz 138/1** (SdKfz for *Sonder Kraftfahrzeug*, or special vehicle) and it was this vehicle that was retained as the German army's standard sIG 33 carrier until the end of the war. The SdKfz 138/1 had a crew of four men including the driver, and 15 shells were carried on the vehicle. There was no room for more because the fighting compartment was rather restricted for space.

There was one other sIG 33 self-propelled version, this time on a PzKpfw III chassis. This **15-cm sIG 33 auf PzKpfw III** appeared in 1941 and used a large box superstructure on a PzKpfw III to house the sIG 33. This proved to be rather too much of a good thing, for the chassis was really too large for the weapon which could be easily carried by lighter vehicles. Thus production never got properly under way, being terminated after only 12 conversions had been made. These vehicles were used in action on the Eastern Front.

All the sIG 33 self-propelled equipments were used for their original role, i.e. the direct fire-support of infantry units in the field. Perhaps the most successful of these self-propelled carriages were the Bison and the later SdKfz 138/1. Over 370 of the vehicles were produced, and they were still in production in late 1944.



Taken from a German newsreel, this shot clearly shows how high and awkward the mounting of the 15-cm howitzer really was on the PzKpfw I chassis. The crew had only limited protection and stowage was minimal, but it provided the Germans with an indication of what would be required in future.

Specification

SdKfz 138/1

Type: self-propelled infantry-support howitzer

Crew: 4

Weight: 11500 kg (25,353 lb)

Powerplant: one Praga 6-cylinder petrol engine developing 111.9 kW (150 hp)

Dimensions: length 4.835 m (15 ft 10.4 in); width 2.15 m (7 ft 0.6 in); height 2.4 m (7 ft 10.5 in)

Performance: maximum road speed 35 km/h (21.75 mph); maximum road range 185 km (115 miles); fording 0.914 m (3 ft)

Armament: one 15-cm (5.9-in) howitzer

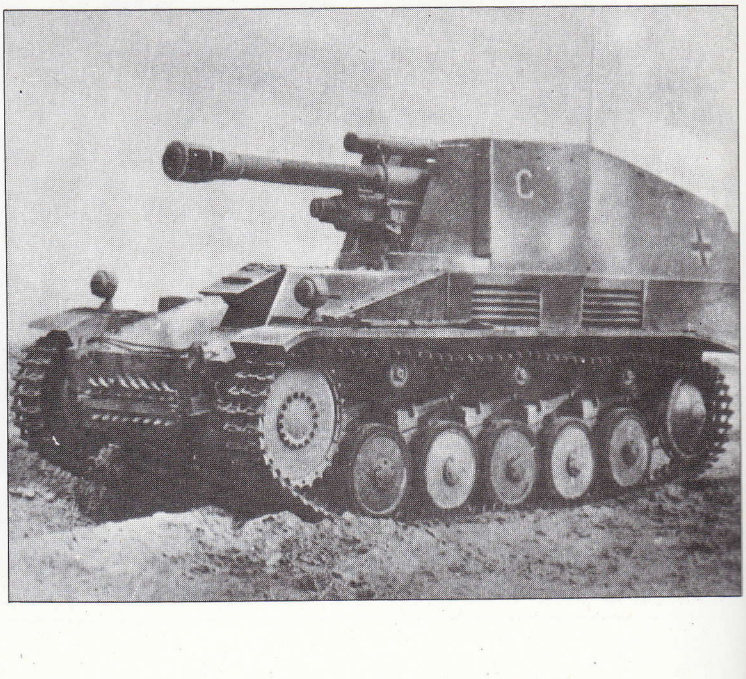
GERMANY

Wespe

Even as early as 1939 it was obvious that the days of the little PzKpfw II tank were numbered, for it lacked both armament and armour. However, it was in production and quite reliable, so when the need arose for self-propelled artillery the PzKpfw II was selected to be the carrier for the 10.5-cm (4.13-in) leFH 18 field howitzer. The conversion of the tank hull to carry the howitzer was quite straightforward, for the howitzer was mounted behind an open topped armoured shield towards the rear of the hull and the area where the turret had been was armoured over and the space used for ammunition stowage. Maximum armour thickness was 18 mm (0.7 in).

The result was the self-propelled howitzer known as the **Wespe** (wasp) though its full official designation was rather more cumbersome: **leFH 18/2 auf Fgst Kpfw II (Sf) SdKfz 124 Wespe**, but to everyone it was just the Wespe. It was a very popular little self-propelled weapon that soon gained for itself a reputation for reliability and mobility. The first of them were based on the PzKpfw II Ausf F chassis and went into action on the Eastern Front during 1943. On this front they were used by the divisional artillery batteries of the Panzer and Panzergrenadier divisions. They were usually organized into batteries of six howitzers with up to five batteries to an *Abteilung* (battalion).

The Wespe was so successful in its artillery support role that Hitler himself made an order that all available PzKpfw II chassis production should be allocated to the Wespe alone, and the many other improvised weapons on the PzKpfw II chassis were dropped or their armament diverted to other chassis. The main Wespe construction centre was the Famo plant in Poland, and there production was so rapid that by mid-1944 682 examples had been built. Some time around that



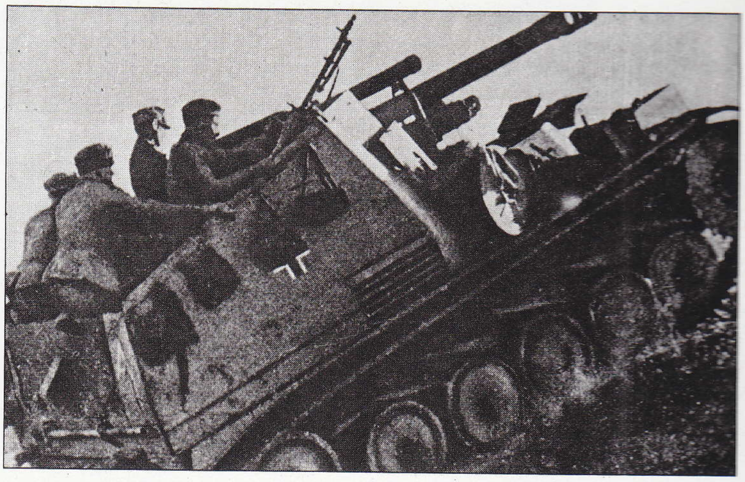
The SdKfz 124 Wespe was a purpose-built carrier for a 105-mm howitzer based on the chassis of the PzKpfw II light tank. It was first used during 1942 and had a crew of five.

date manufacture of the Wespe ceased, but not before 158 had been completed without howitzers; these vehicles had the gap in the armour plate for the howitzer sealed off, the space behind the armour being used for resupply ammunition needed by batteries in the front line.

A typical Wespe went into action carrying its crew of five, including the driver, and 32 rounds of ammunition. A Wespe battery was completely mobile, although some of the vehicles were soft-skinned trucks for carrying ammunition and other supplies. The forward observers were usually carried in light armoured vehicles although some batteries used ex-Czech or captured French tanks for this purpose. Fire orders were relayed back to the battery by radio, and from the battery fire command post the orders were further relayed to the gun positions by land lines. The howitzer carried on the Wespe was the standard 10.5-cm leFH 18 as used by towed batteries (although most were fitted with muzzle brakes) and so used the same ammunition. They also had the same range of 10675 m (11,675 yards).

Specification

Wespe
Type: self-propelled field howitzer
Crew: 5
Weight: 11000 kg (24,251 lb)
Powerplant: one Maybach 6-cylinder petrol engine developing 104.4 kW (140 hp)
Dimensions: length 4.81 m (15 ft 9.4 in); width 2.28 m (7 ft 5.75 in); height 2.3 m (7 ft 6.6 in)
Performance: maximum road speed 40 km/h (24.85 mph); road range 220 km (137 miles); fording 0.8 m (2 ft 7.5 in)
Armament: one 105-mm (4.13-in) howitzer and one 7.92-mm (0.31-in) MG34 machine-gun



This shot of a Wespe on the move shows that the top of the fighting compartment was open but protection was provided at the rear. Note how small the vehicle actually was compared to the stature of the gun crew in the compartment.

GERMANY

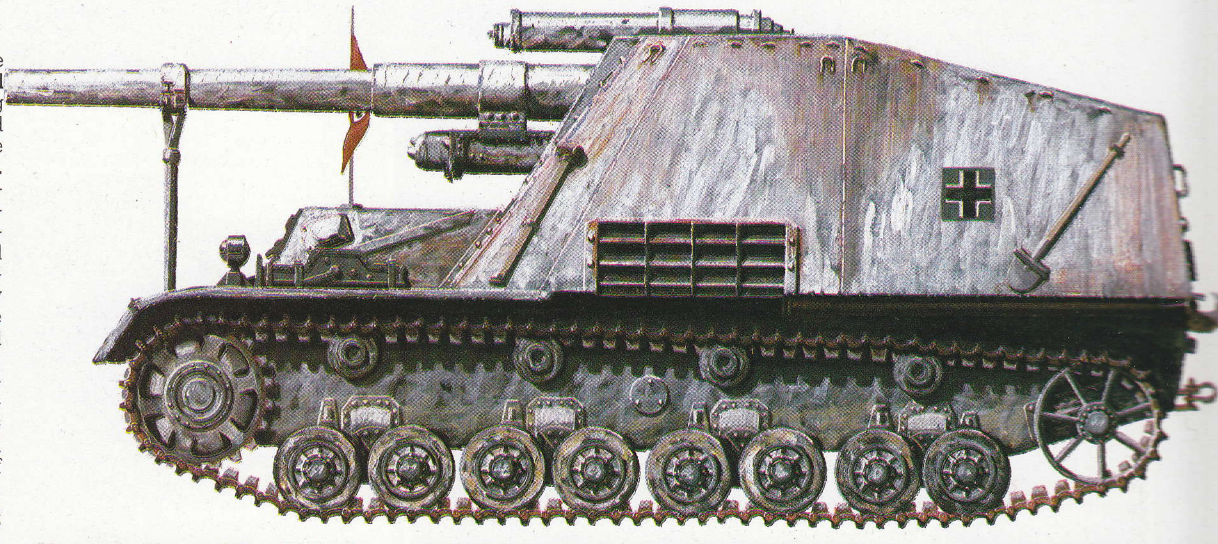
Hummel

The self-propelled artillery vehicle that became known as the **Hummel** (bumble bee) was a hybrid combining components of the PzKpfw III and PzKpfw IV tanks into a new vehicle known as the **Geschützwagen III/IV**. The first of these hybrids was produced during 1941 and used a lengthened PzKpfw IV suspension and running gear combined with the final drive assemblies, track and transmission of the PzKpfw III. Onto this new hull was built an open superstructure formed with light armour plates, and two types of weapon were mounted. Vehicles intended for use as tank destroyers mounted a version of the 88-mm (3.46-in) anti-tank gun, but vehicles intended for use as self-propelled artillery mounted a special version of the 15-cm (5.9-in) FH 18 field howitzer.

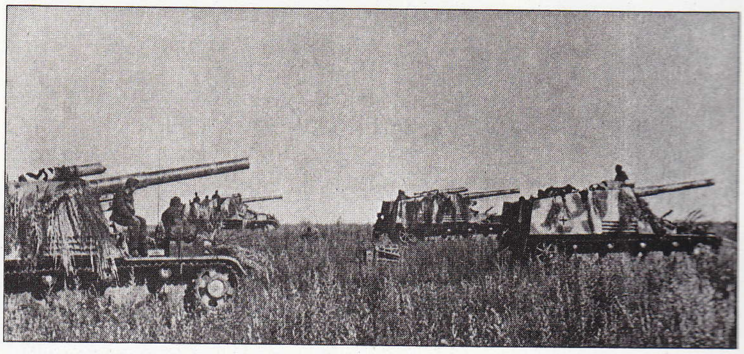
The FH 18 vehicle was the **15-cm Panzerfeldhaubitze 18M auf GW III/IV SdKfz 165 Hummel**, and it formed the heavy field artillery element of the Panzer and Panzergrenadier divisions from 1942 onwards. The ordnance was known as the Panzerfeldhaubitz 18/1, and could fire a 43.5-kg (95.9-lb) projectile to a range of 13325 m (14,572 yards). The first howitzers produced for the self-propelled role were fitted with large muzzle brakes, but experience demonstrated that these were not really necessary and were accordingly left off later production versions. Maximum armour thickness was 50 mm (1.97 in).

The Hummel had a crew of five, including the driver who sat in an armoured position forward. The provision of an armoured compartment for the driver alone was considered a luxury in war-production terms, but instead of eliminating this feature the designers made the whole thing cheaper by enlarging the armoured position and employing more flat steel plates. Thus more internal space was provided for one of the crew members. The Hummel could carry only 18 rounds of ammunition so more had to be kept nearby and brought up when necessary. Trucks were often of little value for this task, so by late 1944 no less than 150 Hummels were produced without the howitzer and the divided front armour plates replaced by a single plate. These vehicles were used as ammunition carriers for the Hummel batteries. By late 1944 no less than 666 Hummels had been produced and the type remained in production until the end of the war. They proved to be useful and popular weapons, and were used on all fronts. Special versions with wider tracks known as Ostkette were produced for use during the winter months on the Eastern Front, and the open superstructures were often covered with canvas tarpaulins to keep out the worst of the weather. The gun crew generally lived with the vehicle, so many Hummels were festooned not only with camouflage of all kinds but also with bed rolls, cooking pots and items of personal kit.

The Hummel was one of the Germans' best examples of purpose-built self-propelled artillery. It had plenty of room for the crews to serve the gun, and the carriage gave the howitzer the desired mobility to enable them to keep up with the Panzer divisions.



Above: The Hummel (bumble bee) was a purpose-built German vehicle that used components from both the PzKpfw III and IV. Used on all fronts, it was a successful weapon that remained in production until the war ended. It had a crew of five.



A battery of four Hummels stand ready for action on a Russian steppe in 1942. The closeness of the guns and the overall lack of concealment demonstrates that the Luftwaffe had air superiority at this time, otherwise the guns would have been much more dispersed and camouflaged.

Specification

Hummel
Type: self-propelled howitzer
Crew: 5
Weight: 24000 kg (52,911 lb)
Powerplant: one Maybach V-12 petrol engine developing 197.6 kW (265 hp)
Dimensions: length 7.17 m (23 ft 6.3 in); width 2.87 m (9 ft 5 in); height 2.81 m (9 ft 2.6 in)
Performance: maximum road speed 42 km/h (26.1 mph); road range 215 km (134 miles); fording 0.99 m (3 ft 3 in)
Armament: one 15-cm (5.9-in) howitzer and one 7.92-mm (0.13-in) machine-gun

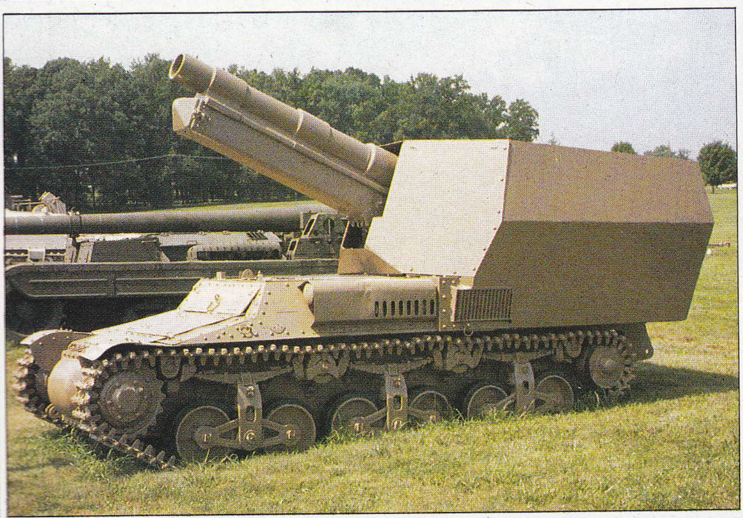
German 'Lash-ups'

In the wake of the lightning conquests of 1939-40, the German army's demands for self-propelled artillery soon outstripped factory production. With typical ingenuity, the Germans utilized the mass of tanks they had captured to produce a series of unusual improvisations.

In many ways the German army's heady successes of 1940 and 1941 were a long-term headache for the nation's war planners. They had not envisaged a European war breaking out before 1943 at the earliest, and both the German armed forces and defence industry were badly placed when war began in 1939. Hitler's political gambles at last produced a real war when he invaded Poland in September 1939, but the huge successes of the German armed forces distracted from the fact that they were ill-prepared for the type of Blitzkrieg employed by the German general staff. Many weapons were quite simply not up to the tasks asked of them, and there were never enough weapons either in the field or in reserve. Many of the major victories gained by Germany between 1939 and 1941 were produced as much by their enemies' unpreparedness and lack of cohesion as by the tactics and equipment of the German armed forces.

All this was to be revealed generally once the Germans began to lose the strategic initiative in 1942; but by then many of their faults were self-apparent. They quite simply lacked the equipment necessary to arm the ever-growing number of their divisions, and the shortages ranged from everyday items like telephone wire to heavy weapons. This was particularly true of artillery, for in 1940 most if not all of the German artillery was still towed, the bulk of it by horses. The first *Sturmgeschütze* (assault guns) made their debut during the French campaign, but for artillery support of the fast-moving Panzer divisions the German gunners had to rely on what was to be the first of a long string of equipments that can only be described as 'lash-ups'.

The first of these was a marriage of the very useful 15-cm (5.9-in) sIG 33 infantry support weapon with the chassis of the PzKpfw I light tank. The PzKpfw I had been designed for use only as a training tank, but it was still around as a front-line vehicle in 1940 although it was of very limited combat use. The Germans just replaced the turret of this vehicle with a sIG 33, complete with its wheels and carriage; a thin armour shield was placed around the gun and that was it; thus, they had something that could keep up with the tanks, and the first item of German self-propelled artillery was in the field.



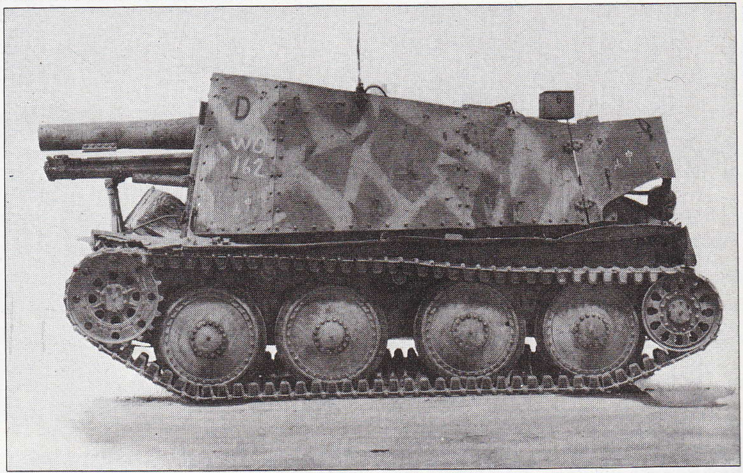
The conversion of captured French Lorraine tracked vehicles to carry the German sIG 33 15-cm infantry howitzer was so successful that the result became a standard German vehicle known as the SdKfz 135/1. It had a crew of four, including the driver.

This initial attempt was not a great success, but served for some years. It was eventually replaced by more formal designs, most of which are described in these pages. But apart from the self-propelled German equipments discussed in this study there were many more that deserve mention. Few of them were 'formal' designs in the sense that they passed through the usual stringent design or testing stages. Instead they were knocked together by units in the field to provide themselves with local-defence or support weapons.

This policy was the result of two main factors. One has already been mentioned, namely the inability of Germany's defence industries to supply weapons and equipment in the quantities required; after 1941 the demands of the Eastern Front were such that it alone was allocated nearly all of the production quotas and still demanded more and more. The other fronts had to take what remained, or survive with what they could produce themselves, and this was particularly true along the Atlantic Wall once the Eastern Front campaigns were under way. Here the second factor arose: in such theatres the German forces had to make do with what they could get. The new production material went to the Eastern Front, and nothing could be spared for what were seen as purely defensive formations sitting along the coastal and internal defences of the occupied territories; it was here that the atmosphere was right for the German 'lash-up' to flourish.

Fortunately for them, the Germans had a rich stockpile with which to work. The victories of 1940 had left them with piles of weapons and equipment of all kinds, and these were duly passed to the occupation divisions in France and elsewhere. Items such as trucks were taken for the Eastern Front, but that still left large numbers of guns, small arms and tanks that were usually quite serviceable. Much of the captured French armour was of the 'tankette' type or consisted of heavier tanks that had either inadequate armament or one-man turrets that the Germans understandably did not want to use. But very often the hulls and chassis were good enough for further use and the 'lash-up' programme started.

As many of the German divisions in France and the occupied countries had only horse-drawn artillery, they understandably wanted to increase its mobility by the introduction of self-propelled mountings. There was no chance that they would ever see shiny new Wespe or Bison weapons, so these divisions initiated a programme that was to produce some of the oddest self-propelled artillery carriages ever seen. Virtually every French and other vehicle were used as the carriages for German artillery pieces. The units in France produced some of the oddest types, for they had to hand a diversity of vehicles ranging from ammunition carriers to tanks. The Chenilette Lorraine, originally a small artillery tractor or supply carrier, was the smallest type and this was used to mount howitzers as large as 15 cm (5.9 in). One of these conversions involved the 15-cm sFH 13 field howitzer dating from World War I, and was considered so successful that some of them ended up in North Africa. This was unusual, for most of the lash-ups remained for strictly local deployment. Not all the conversions were for artillery use only. Many old captured tank and other chassis had anti-tank guns of one type or another, and many others were simply converted to turretless artillery tractors or ammunition carriers.



The SdKfz 138/1 Bison was a conversion of the Czech Skoda PzKpfw 38(t) to carry the 15 cm sIG 33 infantry howitzer for the close fire-support role. The Bison had the howitzer mounted forward; later PzKpfw 38(t) conversions had it mounted well to the rear with the engine forward.

Apart from the anti-tank guns, the German 10.5-cm (4.13-in) field howitzers were among the main candidates for extemporized self-propulsion. The French tanks such as the Hotchkiss H-39 were often converted to carry the 10.5-cm howitzer, and their turrets were carted off to be set into the concrete defences of the Atlantic Wall. Perhaps the oddest-looking of all these conversions was that carried out using the French B1 bis as a basis. This had the turret removed in the usual way and replaced by a fixed turret mounting a 10.5-cm leFH 18. This made the resultant product look both too high for comfort and awkward to an extreme. But for the German gunners it was such monsters or nothing as far as self-propelled artillery was concerned.

French armour was not the only source of conversions. Italy was another source, but there conversions were fewer as the Germans simply pressed into action any Italian weapons they could find. This usually meant the various Italian *semovente* that were not far removed from the German StuG III in armour and armament.

The lash-ups were many and various. Not all of them concerned artillery, for rocket projectors, flamethrowers and even command vehicles had their origins in local conversions. Mortar carriers were another product.

Apart from the Chenilette Lorraine conversion with the sFH 13, few of the lash-ups saw service outside their original localities. There they were used in their original command and organization structure alongside the other unconverted towed artillery batteries. When it came to the crunch in 1944 few of these lash-ups presented their opponents with any trouble. Most of them were virtual death-traps for their crews, but the even less welcome alternative was to face the Allies with horse-towed weapons. German industry was unable to help them in any way.

GERMANY

The Waffentrager

The **Waffentrager** (literally weapons carrier) was a novel concept for the Germans when it was first mooted during 1942. The idea was that the Waffentrager was to be not so much a form of self-propelled artillery but a means of carrying an artillery piece in a turret into action, where it would be removed from the tank, emplaced, used in action, and picked up again when no longer required. The exact tactical requirement for this arrangement is still uncertain, for in 1942 the Panzer divisions were still dictating mobile warfare to all opponents and the need for a static artillery piece seems remote.

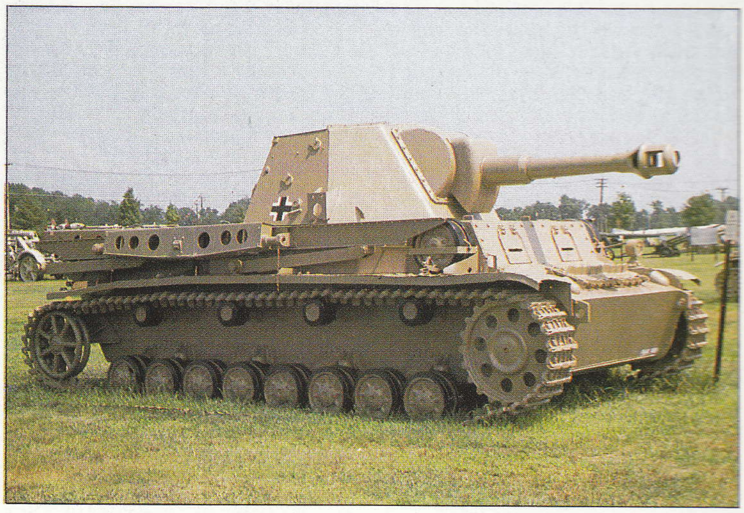
Be that as it may, a series of eight vehicles known generally as **Heuschrecke IVB** (locust) were produced during 1942. These vehicles were converted PzKpfw IV tanks with a gantry at the rear to lift off the turret mounting a 10.5-cm (4.13-in) light field howitzer. The turret could be emplaced on the ground for action or it could be towed behind the vehicle on wheels carried on the rear specifically for this purpose; this arrangement allowed the vehicle to be used as an ammunition carrier for the turret.

The eight vehicles produced were no doubt used in action, for one of them was captured and is now to be seen in the Imperial War Museum in London, but at the time no more were requested. But by 1944 things had changed somewhat. The German army was everywhere on the defensive and anything that could hold up the advancing Allies was investigated. The Waffentrager concept came within this category, and more designs were initiated. One was an interim design in which a normal field howitzer, a 10.5-cm leFH 18/40, was carried in an armoured superstructure on top of a modified Geschützwagen III/IV (normally used for the Hummel). The howitzer could be fired from the vehicle, but it was also designed to be removed from the carrier using a block and tackle and mounted on the ground as a normal field piece once the wheels and carriage trails had been fitted. This design did not get far for it was overtaken by a series of design projects that were in turn overtaken by the end of the war.

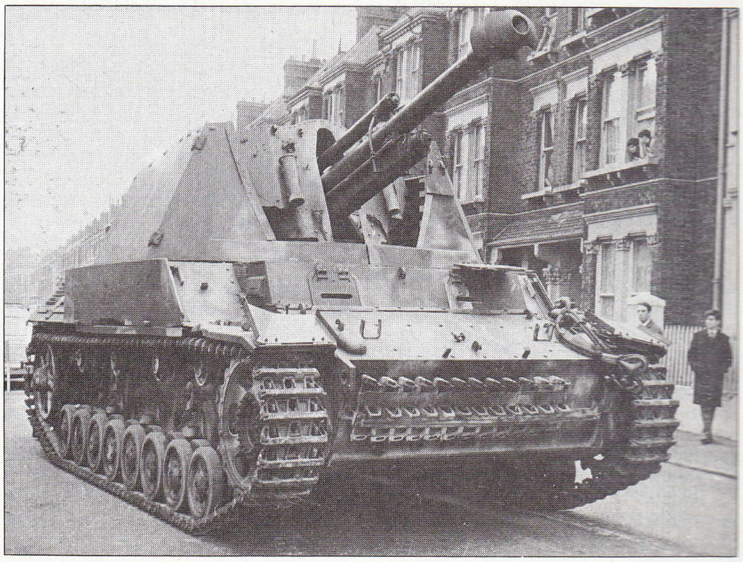
These late-1944 and early-1945 Waffenträger all adopted the removable turret concept used in the 1942 Heuschrecke IVB. They had a variety of chassis, including both the modified PzKpfw IV and Geschützwagen III/IV. The artillery pieces involved ranged from 10.5-cm to 15-cm (5.9-in) howitzers. One that got as far as model form was to have carried either the 10.5-cm or 15-cm howitzer on a cruciform carriage that would have been used with the '43' series of weapons had they ever advanced further than the prototype stage. These howitzers were mounted in an open-backed turret, and could be fired from the carrier or from a ground mounting. They could also be towed behind the carrier on their field carriages. It was all rather complicated and overengineered as it involved the use of ramps and winches, and the concept was typical of many that never got to the hardware stage. But a few such equipments were built only to be overtaken by the end of the war, being broken up or scrapped in the post-war years.

Specification

Heuschrecke IVB
Type: self-propelled howitzer carrier
Crew: 5
Weight: 17000 kg (37,479 lb)
Powerplant: one Maybach petrol engine developing 140.2 kW (188 hp)
Dimensions: length 5.90 m (19 ft 4.3 in); width 2.87 m (9 ft 5 in); height 2.25 m (7 ft 4.6 in)
Performance: maximum road speed 45 km/h (28 mph); road range 250 km (155 miles)
Armament: one 10.5-cm (4.13-in) howitzer



The Heuschrecke was one of a number of experimental German vehicles that were meant to carry an artillery piece to a firing site and then lower the piece to the ground for firing. The Heuschrecke was the only one of many similar designs to be produced in any numbers.



This Heuschrecke prototype was one in which a 105-mm field howitzer was carried on a chassis produced from PzKpfw III and IV components in order for it to be lowered to the ground when at the firing position. The howitzer could be fired from the vehicle if required.

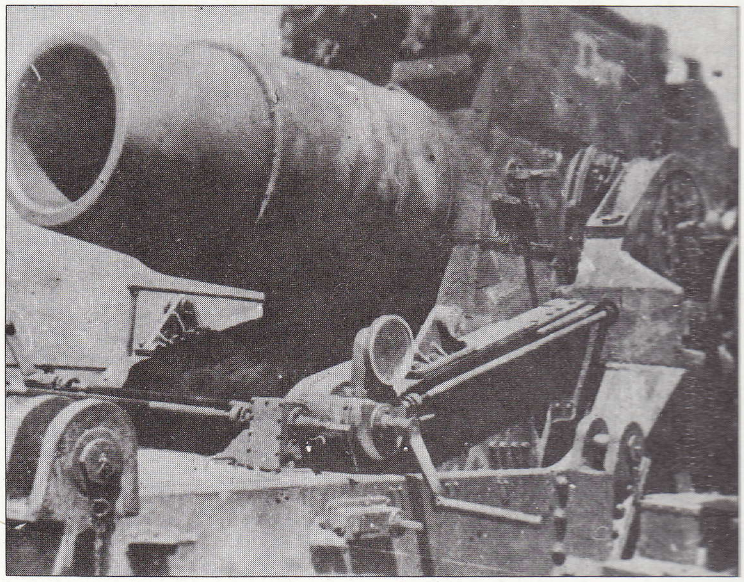
GERMANY

Karl series

The weapons known as **Karl** were originally devised as anti-concrete weapons for the demolition of the Maginot Line forts and other such fortified locations. They were produced during the 1930s following a great deal of mathematical and other theoretical studies carried out during the 1920s. Work on the actual hardware began during 1937, and the first equipment was ready by 1939.

The Karl series must be regarded as being the largest self-propelled artillery weapons ever produced. There were two versions. One was the **60-cm Mörser Gerät 040** which mounted a 60-cm (23.62-in) barrel and the other the **54-cm Mörser Gerät 041** which mounted a 54-cm (21.26-in) barrel. Both weapons fired special concrete-piercing projectiles. The range of the Gerät 040 was 4500 m (4,921 yards) and that of the Gerät 041 6240 m (6,824 yards). Both could penetrate between 2.5 and 3.5 m (8.2 and 11.5 ft) of concrete before detonating to produce maximum effect. These projectiles were massive items. The 60-cm shell weighed no less than 2170 kg (4,784 lb), although a lighter version was also used. The 54-cm shell weighed 1250 kg (2,756 lb).

Both Karl weapons were massive, ponderous brutes. Although technically self-propelled, their mobility was limited by their sheer weight and bulk and the tracked carriages were meant for only the most local of moves. For long-distance travel they were carried slung between special railway trucks. Shorter moves were made by removing the barrel from the carriage and placing both the barrel and the carriage on separate special trailers towed by heavy tractors. Assembly



The Karl howitzers were intended to smash the Maginot Line forts, but were instead used against the Sevastopol defences and later against Warsaw in 1944. They fired special anti-concrete projectiles that exploded only when they had penetrated their targets.

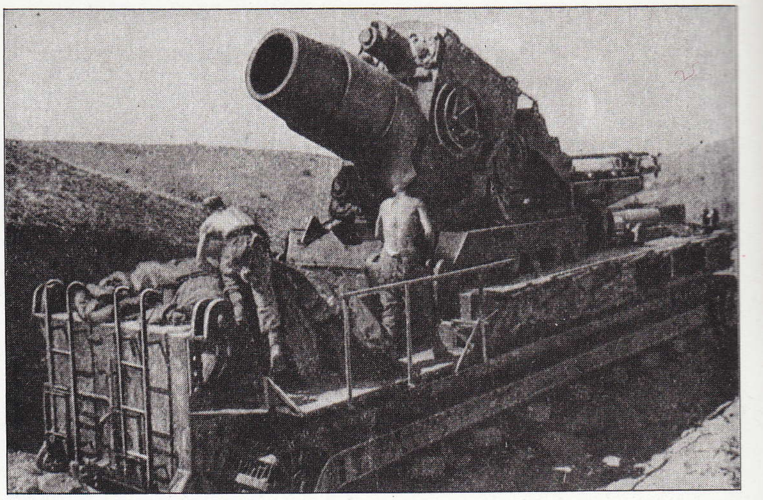
Karl series (continued)

and break-down was carried out using special mobile gantries. The whole process was difficult to an extreme, but the Karl weapons were not intended for mobile warfare. They were produced to reduce fortresses and that meant a long, planned approach to the firing site, a slow rate of fire (the best was one round every 10 minutes) and a steady withdrawal once the fortress had been reduced.

The Karls were too late for the Maginot Line, which fell along with the rest of France in 1940. Their first real engagement was the siege of Sevastopol in exactly their designed role. Following the successful end of that siege more Karls were used during the Warsaw uprising when they were used to demolish the centre of Warsaw and crush the Polish underground fighters.

By then it was 1944. Most of the early 60-cm barrels had then been replaced by 54-cm barrels, but Warsaw was their last period in action. The increasing mobile warfare of the last year of the war gave the Karls no chance to demonstrate their destructive powers, and most were destroyed by their crews in the last stages of the war. Only a few of the special PzKpfw IV ammunition carriers produced to carry projectiles for the Karls survived for Allied intelligence staffs to examine. It is possible that one example of the Karl may survive as a museum piece in the Soviet Union, but that is all.

Specification
Gerät 041
Type: self-propelled siege howitzer
Crew: not recorded
Weight: 124000 kg (273,373 lb)
Powerplant: one V-12 petrol engine developing 894.8 kW (1,200 hp)
Dimensions: length of barrel 6.24 m (20 ft 5.7 in); length of carriage 11.15 m (36 ft 7 in); track 2.65 m (8 ft 8.3 in)
Performance: not recorded
Armament: one 54-cm (21.26-in) howitzer/mortar



The massive 60-cm and 54-cm Karl howitzers were really fortification-smashing equipments, and they had only limited tactical mobility. They had to be carried to the firing positions by special trailers in pieces and assembled on site.

GERMANY

Brummbär

Despite their overall success, the StuG III assault guns were considered by 1943 as being too lightly armoured for the assault role, and a new heavy assault vehicle was required. The existing 15-cm (5.9-in) sIG 33 self-propelled equipments lacked the armour protection required for the close-support role and so, with the PzKpfw IV tank gradually being replaced by the Panther and Tiger tanks, there was the chance to produce a purpose-built vehicle using the later versions of the PzKpfw IV as a basis.

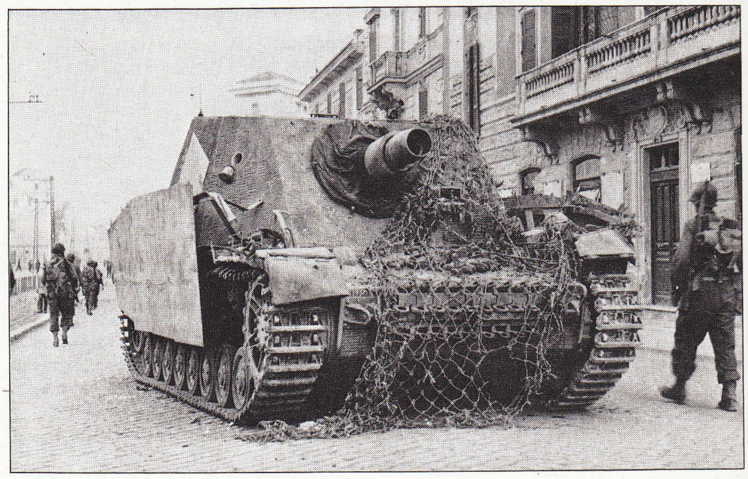
The first examples of this new vehicle appeared during 1943 under the designation *Sturmpanzer IV Brummbär* (grizzly bear). The Brummbär used a box structure formed from sloping armour plates set over the front of a turretless PzKpfw IV, and mounted a specially developed howitzer in a ball mounting on the front plate. This howitzer was known as the Sturmhaubitze 43 and was a shortened version, only 12 calibres long, of the 15-cm sIG 33. Armour was provided all round (the frontal armour being 100 mm/2.54 in thick), so the crew of five men were well protected. Later stand-off side armour was added, and most vehicles acquired a coating of Zimmerit plaster paste to prevent magnetic charges being stuck on to the hull by close-in tank killer squads. A machine-gun was mounted on the hull front plate on late production models, earlier versions having lacked this self-defence weapon.

The roomy fighting compartment of the Brummbär could accommodate up to 38 rounds of 15-cm ammunition. The commander sat to the rear of the howitzer using a roof-mounted periscope to select targets. Two men served the gun and handled the ammunition, while another acted as the gun layer. The driver normally remained in his seat at the left front. Most targets were engaged with direct fire, but provision was made for indirect fire.

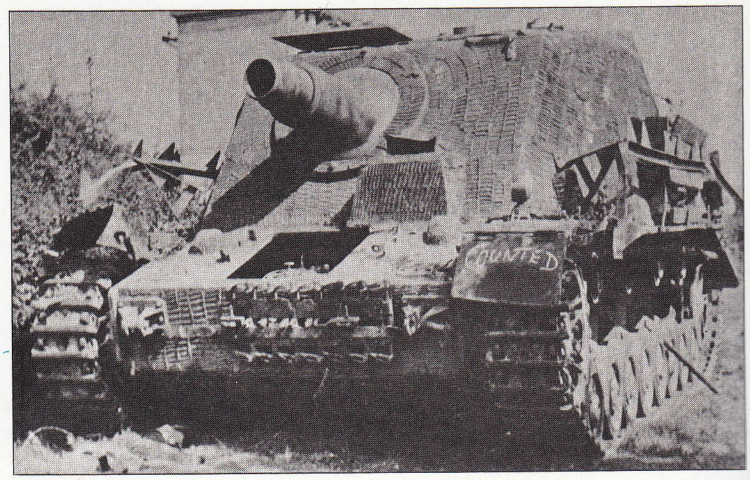
About 313 Brummbär vehicles were produced before the war ended, and most appear to have been used in direct support of Panzergrenadier and infantry units. The vehicles moved forward with the first waves of attacking troops and provided fire to reduce strongpoints and smash bunkers. Infantry had to remain close to prevent enemy tank-killer squads from coming too close to the Brummbär vehicles, which were always vulnerable to close-range anti-tank weapons, especially as some of their side armour was as thin as 30 mm (1.18 in). Brummbär vehicles were generally used in ones and twos split up along an area of attack. As defensive weapons they were of less use, for the short howitzer had only a limited performance against armour as its prime mission was the delivery of blast effect HE projectiles. One factor that restricted the Brummbär's overall mobility was its weight, which gave the vehicle a rather poor ground-pressure 'footprint': it was nippy enough on roads, but across country it could get bogged down in soft ground.

The Brummbär was a well-liked vehicle that often provided exactly the degree of fire support required by infantry formations. On the debit side it was heavy, rather ponderous and the early examples lacked close-in protection. But they were well protected against most weapons and they carried a powerful howitzer.

Specification
Brummbär
Type: self-propelled heavy assault howitzer
Crew: 5
Weight: 28200 kg (62,170 lb)
Powerplant: one Maybach V-12 petrol engine developing 197.6 kW (265 hp)
Dimensions: length 5.93 m (19 ft 5.5 in); width 2.88 m (9 ft 5.4 in); height 2.52 m (8 ft 3.2 in)
Performance: maximum road speed 40 km/h (24.85 km/h); maximum road range 210 km (130 miles); fording 0.99 m (3 ft 3 in)
Armament: one 15-cm (5.9-in) howitzer and one or two 7.92-mm (0.31-in) machine-guns



Most German self-propelled equipments carried only light armour, so when a call was made for a special close-support assault gun the result was the heavily-armoured Brummbär. The Brummbär was often used for street fighting, as this captured example shows.



The Brummbär was normally used when infantry tank-killer squads were likely to be encountered. It was therefore liberally covered with a plaster-like substance known as 'Zimmerit' that prevented magnetic charges from sticking to the hull.

GERMANY

Sturmtiger

Stalingrad taught the German army many lessons, not least of which was that the Germans were ill-equipped for the art of close-quarter street fighting. In typical fashion they decided to meet any future urban warfare requirements by a form of overkill by using a super-heavy weapon that would do away with the need for house-to-house fighting by simply blowing away any defended houses or structures. This they decided to do with a land version of a naval weapon, the depth charge.

In 1943 the Germans produced a version of the Tiger tank known by several names including **38-cm Sturmmörser, Sturmpanzer VI** and **Sturmtiger**. Whatever the designation, the weapon was a Tiger tank with the turret replaced by a large box-shaped superstructure with a short barrel poking through the front sloped plate. This barrel was not a gun but a 38-cm (14.96-in) Raketenwerfer 61 rocket projector of an unusual type, for it fired a rocket-propelled depth charge that weighed no less than 345 kg (761 lb). As this projectile was based upon the design of a naval depth charge nearly all the weight was high explosive; the effect of this upon even the stoutest structure can well be imagined. The rockets had a maximum range of 5650 m(6,180 yards), and the projector barrel was so arranged that the rocket efflux gases were diverted forward to vent from venturi around the muzzle ring. The Sturmtiger was exceptionally well armoured, with 150 mm (5.9 in) at its front and between 80 and 85 mm (3.15 and 3.35 in) at the side.

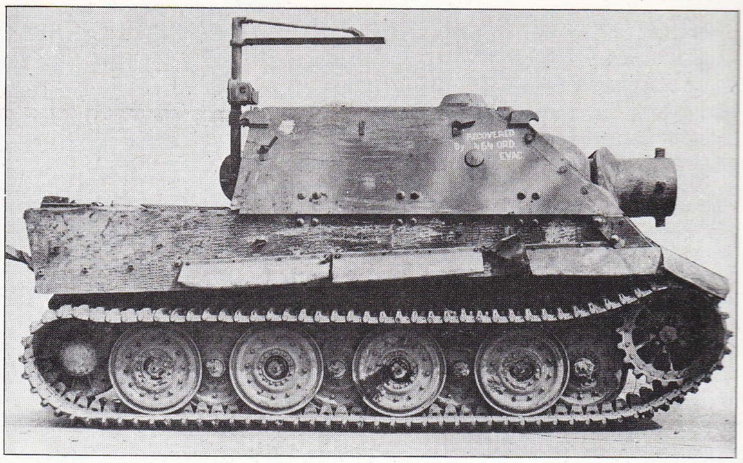
The Sturmtiger had a crew of seven including the commander, a fire observer and the driver. The other four men served the rocket projector. Because of their massive size, only 12 projectiles could be carried inside the superstructure, with the possibility of one more inside the projector. Loading the rockets into the vehicle was helped by a small crane jib mounted on the superstructure rear, and a small hatch nearby allowed access to the interior. Once inside overhead rails assisted in the movement of the rockets to and from their racks along each side, and loading into the projector was carried out using a loading tray.

Although the Sturmtiger prototype was ready by late 1943, it was not until August 1944 that production of this massive vehicle got under way. Only about 10 were ever produced, and these were used in ones and twos on most fronts but in situations where their powerful armament was of little advantage. Consequently most were soon either knocked out in action or simply abandoned by their crews once their fuel allocation had been used.

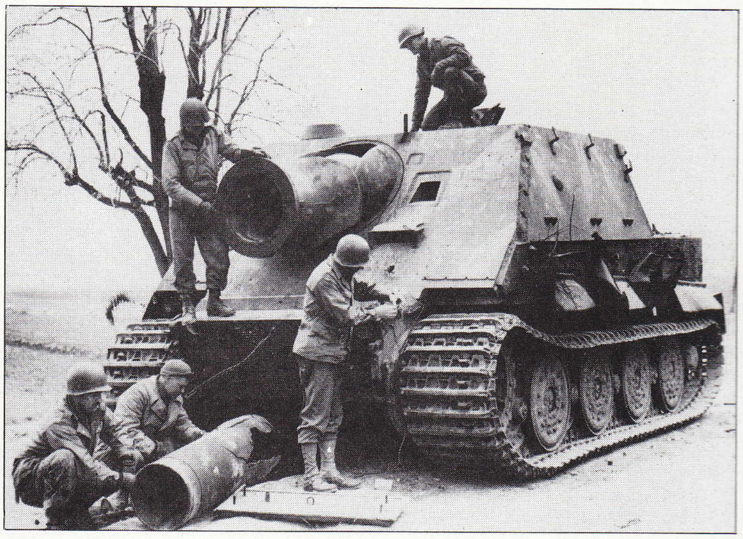
Used as they were in isolation and in such areas as the North Italian campaign, the hulks fascinated the Allies who encountered them and many detailed intelligence reports were written on them. Most realized that the Sturmtiger was a highly specialized weapon that was simply pushed into the field during the latter stages of the war in the German effort to get any weapon into action. If the Sturmtigers had been used as intended for street fighting, they would have been formidable weapons. Instead, by the time they were ready the time of concentrated urban warfare had passed.

Specification

Sturmtiger
Type: assault gun
Crew: 7
Weight: 65000 kg (143,300 lb)
Powerplant: one Maybach V-12 petrol engine developing 484.7 kW (650 hp)
Dimensions: length 6.28 m (20 ft 7.25 in); width 3.57 m (11 ft 8.6 in); height 2.85 m (9 ft 4.2 in)
Performance: maximum road speed 40 km/h (24.86 mph); road range 120 km (75 miles); fording 1.22 m (4 ft)
Armament: one 38-cm (14.96-in) rocket projector and one 7.92-mm (0.31-in) machine-gun



Above: This side shot of a Sturmtiger shows the large armoured superstructure, mounting the 38-cm (14.96-in) rocket projector with the roof-mounted crane needed to load the projectiles into the interior through a hatch at the rear.



Below: Largest of all the German close-support weapons was the Sturmtiger, carrying a 38-cm rocket projector that fired a form of naval depth charge to demolish buildings. This example has been captured by American troops.

GERMANY

Sturmgeschütz III

Following from its experiences in World War I, the German army saw the need for an armoured mobile gun that could follow infantry attacks and provide fire support and the firepower to knock out strongpoints and bunkers. During the late 1930s such a gun was developed using the chassis, suspension and running gear of the PzKpfw III tank. This armoured gun was known as the **Sturmgeschütz III** though its formal designation was **Gepanzerte Selbstfahrlafette für Sturmgeschütz 7.5-cm Kanone SdKfz 142**, (assault gun model 3) and it had the usual upper hull and turret of the tank replaced by a thick carapace of armour with a short 75-mm (2.95-in) gun mounted in the front. This weapon was first issued for service in 1940 (**StuG III Ausf A**) and was soon followed by a whole series of vehicles that gradually incorporated overall and detail improvements, to the extent that when the war ended in 1945 many were still in service on all fronts. The 1941 models were the **StuG III Ausf B, C** and **D**, while the slightly improved **StuG III Ausf E** appeared in 1942.

The main change to the Sturmgeschütz III (or StuG III) series was a gradual programme of upgunning. The original short 75-mm gun was an L/24 weapon (i.e. the length of the barrel was 24 times the calibre) and had limitations against many targets except at short ranges. Thus it was replaced by longer guns with improved performance, first an L/43 (**StuG III Ausf F**) and then an L/48 gun (**StuG III Ausf G**). The latter gun also provided the StuG III series with an anti-tank capability, and this was in a way to the detriment of the original assault-support concept, for it was far easier to produce a StuG than it was a tank, so many StuG IIIs with L/48 guns were diverted to the Panzer divisions in place of battle tanks. Used as a tank-killer the StuG III had its moments, but it lacked traverse and adequate protection for the task. It had to be retained as such, however, for German industry simply could not supply enough tanks for the Panzer divisions.

As an assault gun the StuG III series was far more successful. Eventually the type was upgunned to the stage late in the war when many StuG IIIs were armed with the powerful 10.5-cm (4.13-in) Sturmhaubitze, a special assault howitzer produced for the **StuG III für 10.5-cm StuH 42**. The first of these was completed in 1943, but manufacture of this variant was initially slow. Instead the version with the 75-mm L/48 gun was rushed off the production lines for the Panzer divisions.

The StuG III had a crew of four and extra machine-guns were often carried behind a shield on the roof. The protective mantlet for the main gun underwent many changes before it ended up as a *Saukopf* (literally 'pig's head') mantlet which proved very good protection. More protection against short-range hollow-charge warheads was provided with the addition of *Schützen* (literally 'skirts') along both sides. These were simply sheets of stand-off armour to detonate the warheads before they hit the vehicle armour, and were used on many German tanks after 1943.

As a close-range assault support weapon the StuG III series was an excellent vehicle/weapon combination. It was also relatively cheap and easy to produce, and in war-time Germany that mattered a lot. Therefore the series was built in some numbers and numerically it was one of the most important German armoured vehicles.

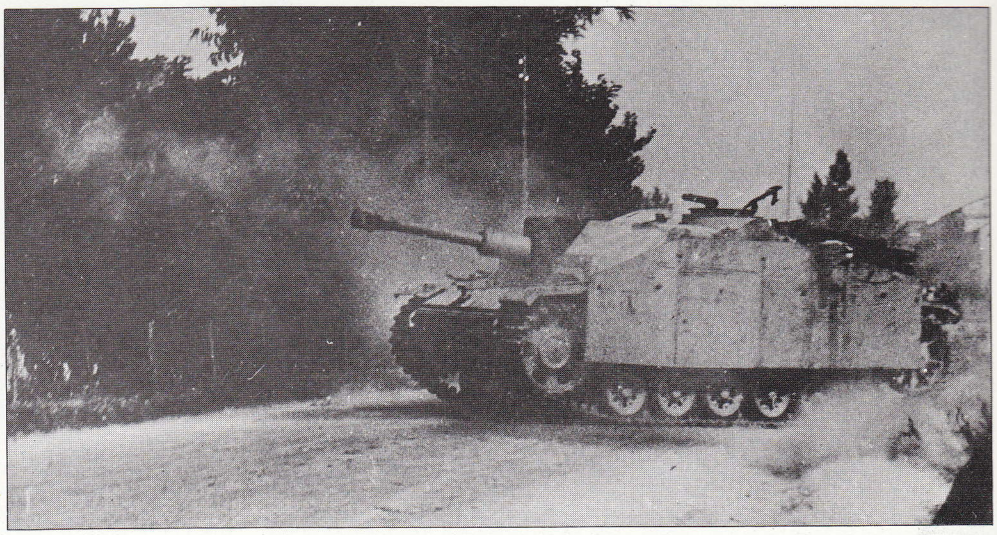
Specification

StuG III Ausf E
Type: assault gun
Crew: 4
Weight: 23900 kg (52,690 lb)
Powerplant: one Maybach V-12 petrol engine developing 197.6 kW (265 hp)
Dimensions: length 6.77 m (22 ft 2.5 in); width 2.95 m (9 ft 8 in); height 2.16 m (7 ft 1 in)
Performance: maximum speed 40 km/h (24.85 mph); road range 165 km (102 miles); fording 0.8 m (2 ft 7.5 in)
Armament: one 75-mm (2.95-in) gun and two 7.92-mm (0.31-in) machine-guns

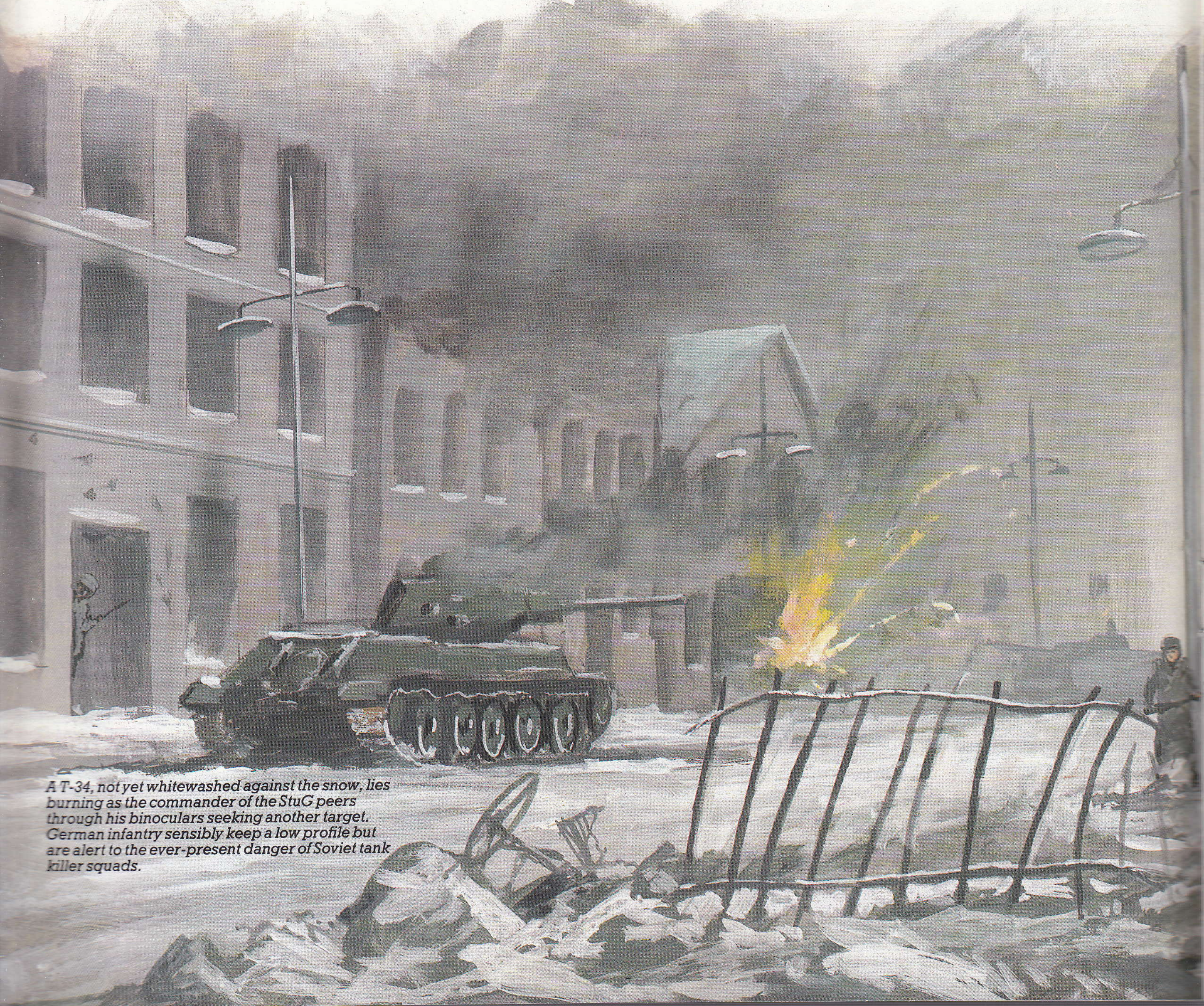
The Sturmgeschütz in Action

Designed to a 1936 Wehrmacht requirement for an armoured close support vehicle, the Sturmgeschütz III was introduced in 1940 and fought in all theatres until 1945, both in an artillery and tank destroyer role.

The German army Sturmgeschütz III was originally to be organized into *Sturmgeschützabteilungen* (assault gun battalions), each with a small headquarters battery and three batteries, each of six or eight vehicles. These *Abteilungen* were usually assigned to Panzergrenadier divisions, where they frequently assumed the responsibilities of the standard anti-tank *Abteilung*, a task for which their 7.5-cm (2.95-in) Sturmkanonen 40 were well suited, for this StuK 40 was a development of the towed 7.5-cm Panzerabwehrkanone 40, or Pak 40. This armament was equally suitable for firing conventional HE ammunition in direct support of units other than the Panzer formations, but all too often the StuG crews found themselves being rushed into action not in support of any particular type of unit but as part and parcel of Panzer division operations.



This StuG III shows the overall low silhouette and the stand-off side armour plates. Although meant to be used as close-support artillery, these vehicles were often used as tank-killers and were often deployed instead of tanks in some Panzer formations, despite their lack of gun traverse.



A T-34, not yet whitewashed against the snow, lies burning as the commander of the StuG peers through his binoculars seeking another target. German infantry sensibly keep a low profile but are alert to the ever-present danger of Soviet tank killer squads.

The main reason for this was the inability of German industry to produce the numbers of tanks required by the ever-expanding Panzer and other divisions, especially after 1941. The German general staff planners had always hoped for a short, sharp war, but with the invasion of the Soviet Union in 1941 (Operation 'Barbarossa') the course of the war was clearly set for a long time. The invasion of the Soviet Union stretched the manpower and materiel levels of the German armed forces to the limit, and calls for ever increasing quantities of equipment became frantic.

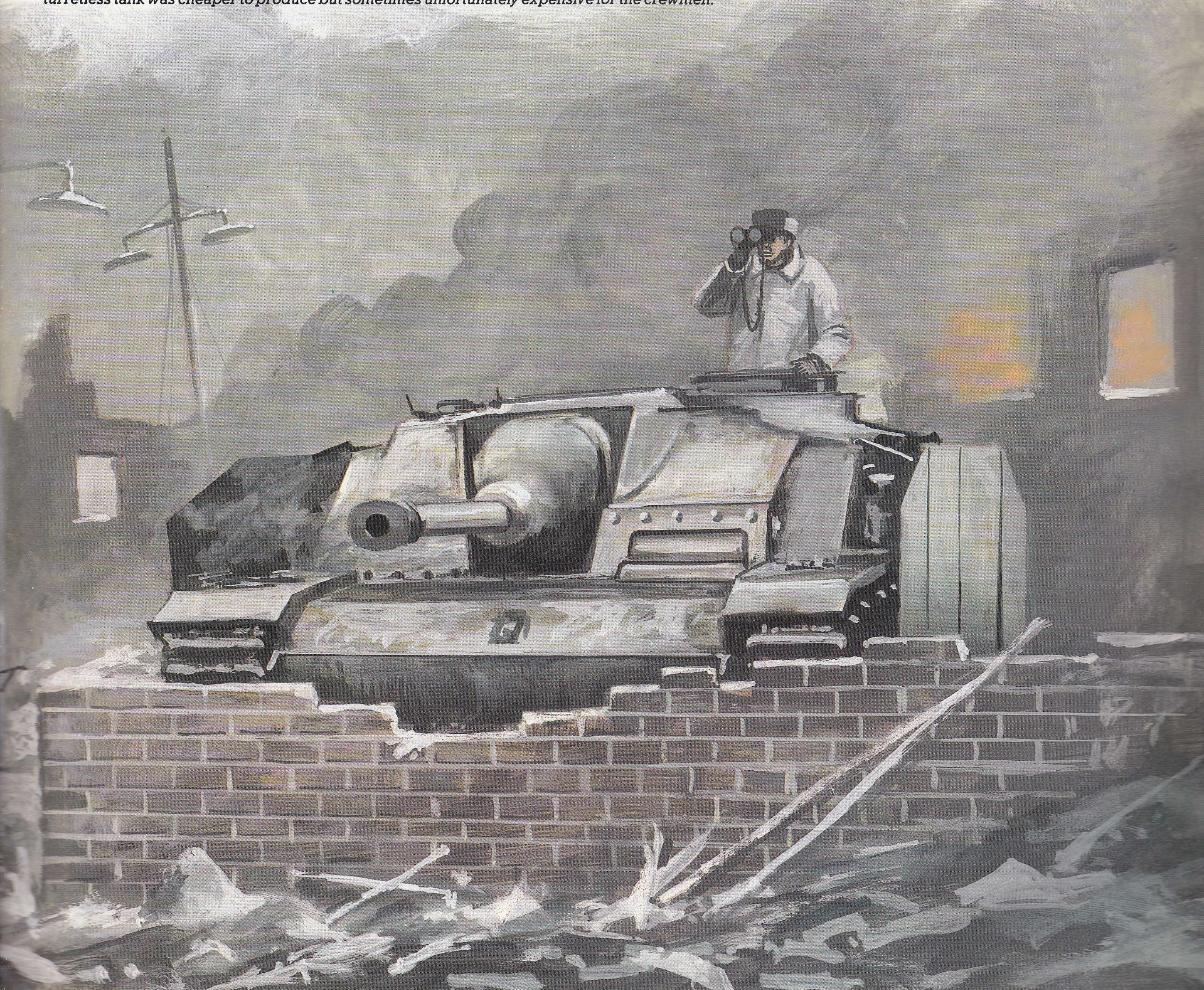
The German army tank arm got considerable priority over other sectors of the army, but as the Russian terrain and the Red Army soaked up more and more of the German tank strength, replacements began to get scarce. The main reason for this was that even as late as 1941 the German defence industries were not yet on a war footing. Shift working was almost unknown, and even the tank factories continued to work at a pace that realized only a small percentage of their true production potential. During 1941 a drastic shake-up of the war industrial organization began, but even with the drafting of forced labour, the introduction of round-the-clock working and a drastic revision of production priorities, tank production could still not match demand. Tanks are not easy things to produce quickly, and although the quality of the German product was usually superb the front-line soldiers always wanted quantity as well as quality.

It was a time for the usual improvisation. In the short term the Panzer formations pressed captured Soviet tanks into their own use. The advances of 1941 and early 1942 meant that huge stockpiles of Soviet equipment fell into German hands, much of it serviceable, and the Germans simply painted out the Soviet markings and painted on their own. This booty included numbers of T-34 tanks, and for a while some German tank formations were completely equipped with T-34s. On the battlefield this was a hazardous policy and many recognition ploys were attempted to define friend from foe, but there was always a risk of incorrect identification and all too often 'German' T-34s became casualties of their own weapons. Despite this, the practice of using captured T-34s persisted right up to the end of the war.

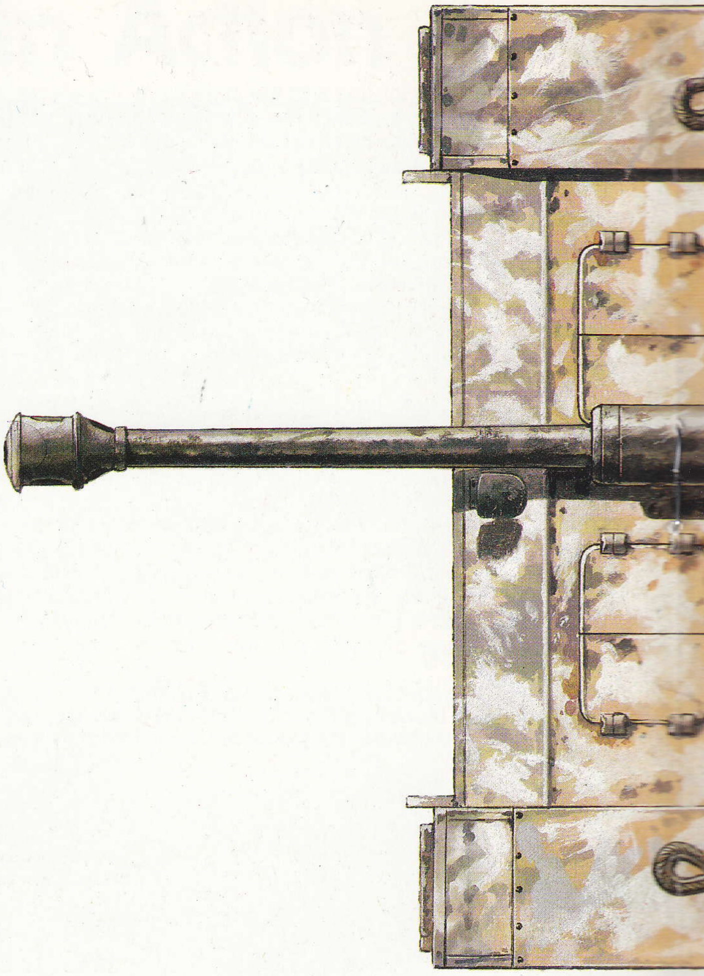
The use of captured equipment could at best be a only a stopgap. In their search for a rapid expedient the German planners hit upon the idea of the StuG, deciding that the StuG III would become an integral part of the Panzer formations. The idea looked good; despite the costs and time involved, it was still relatively easy and inexpensive to produce a StuG in comparison with a tank, for the latter took longer and involved more industrial operations; and weight-for-weight the StuG could carry heavier armament and more armour protection, while it also had a lower tactical silhouette than a tank. Thus the StuG was given a high production priority and the Panzer divisions took what they were given.

By the middle of the war, hand-held anti-tank weapons were becoming an increasing threat to armoured vehicles. One German solution was* Schützen, *literally skirts of thin armour plate attached to the vehicle side which prematurely detonated hollow charge projectiles, dramatically reducing their penetration.

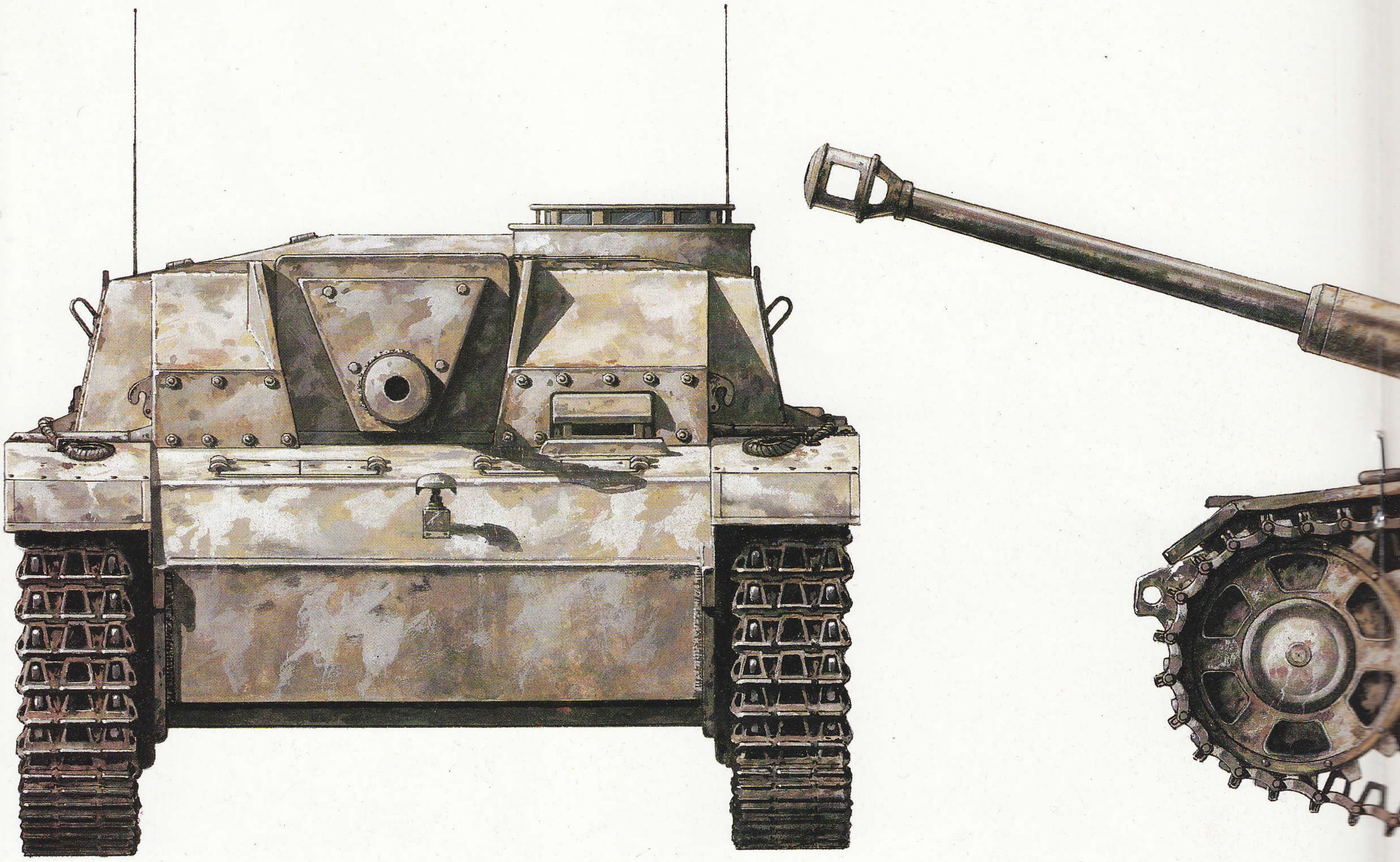
So acute was Germany's shortage of tanks that the StuG was often employed in close combat. Seen here street-fighting on the Eastern Front, the StuG is severely hampered by its lack of gun traverse – a turretless tank was cheaper to produce but sometimes unfortunately expensive for the crewmen.

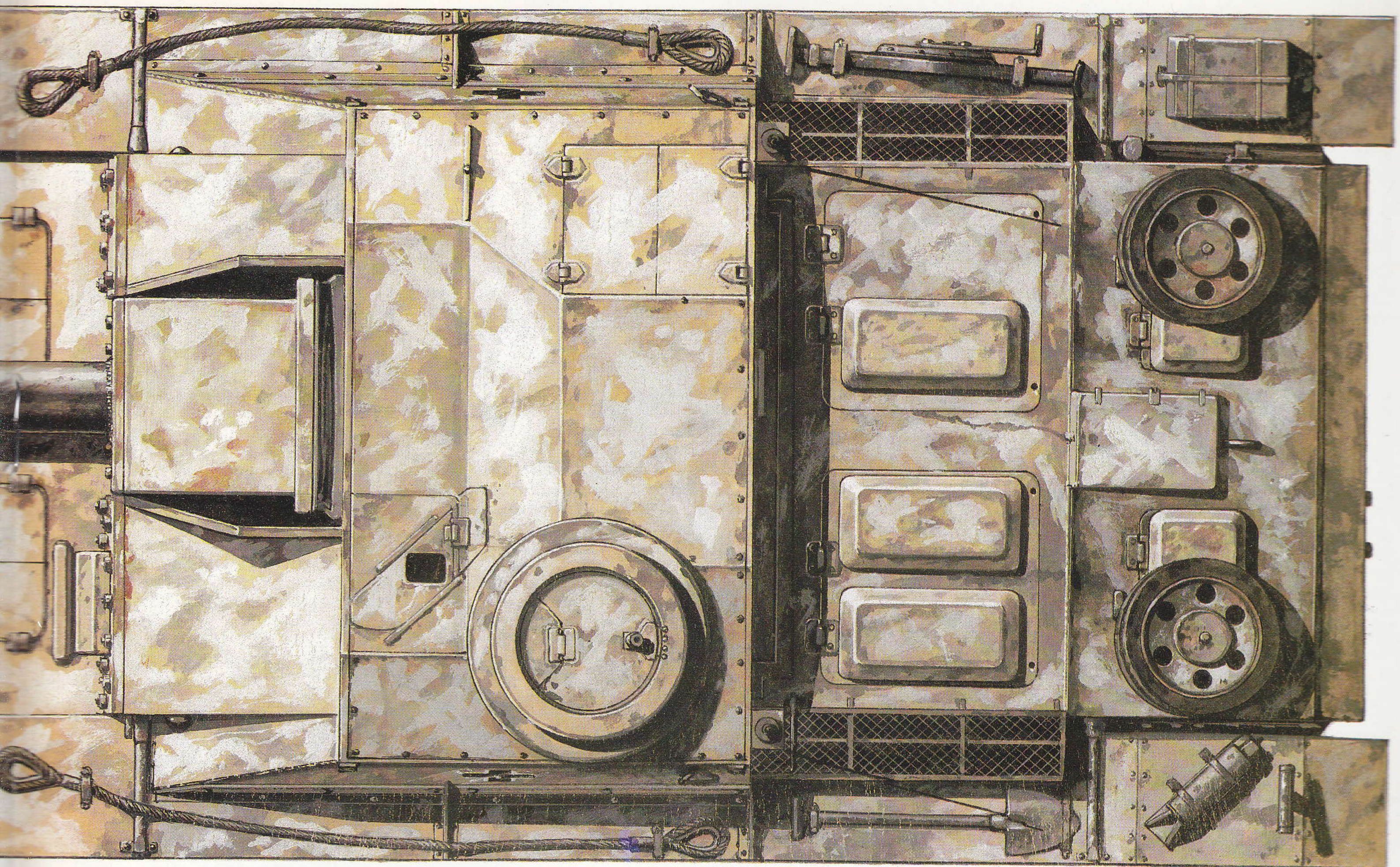


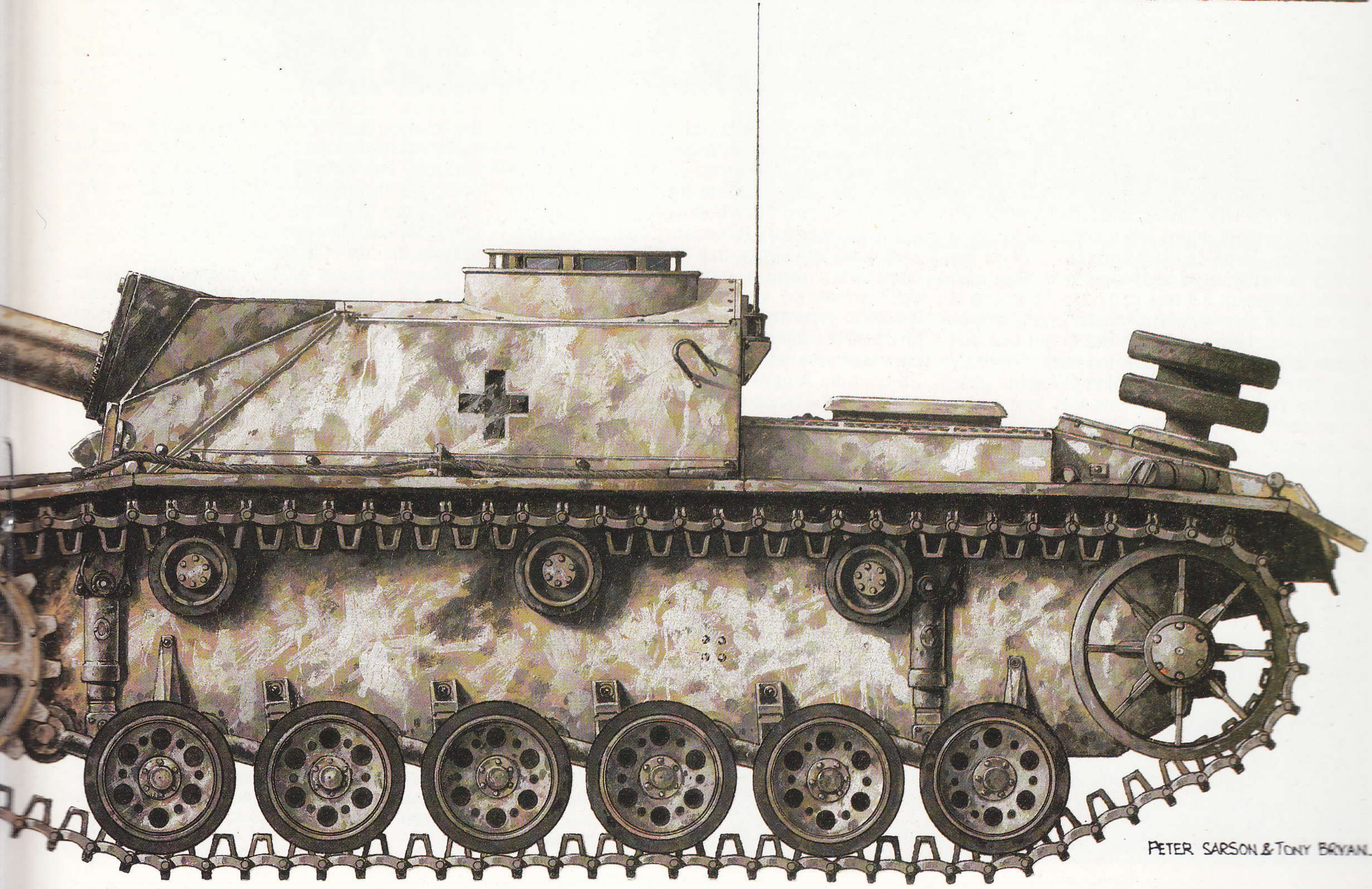
Sturmgeschütz III



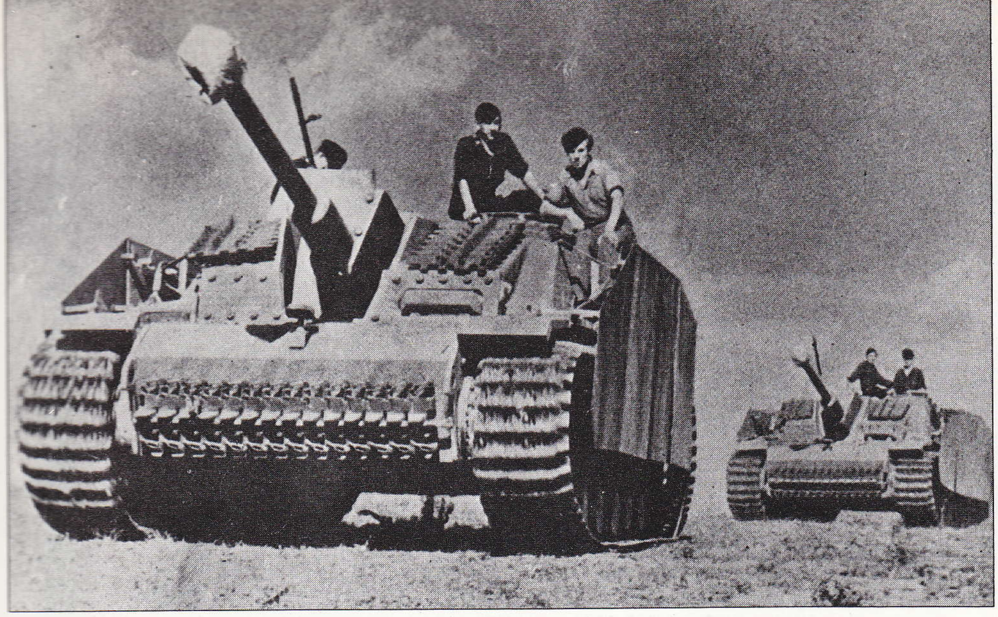
The Sturmgeschütz Sdkfz 142 was based on the chassis of the PzKpfw III with the gun mounted in the hull. The driver's station was unaltered from that of the tank, but behind him now was a large but cramped fighting compartment. Initially fitted with a short 75-mm (2.95-in) gun, the F model shown here was introduced in 1942 and carried a long 75-mm weapon, significantly improving anti-tank capability. The G model with its 75-m L/48, heavier armour and smoke dischargers, was designed more as a tank destroyer than a self-propelled gun. By contrast, as early as 1941 variants were in production mounting a 105-mm (4.1-in) howitzer. Armoured skirts were fitted as standard from 1943.



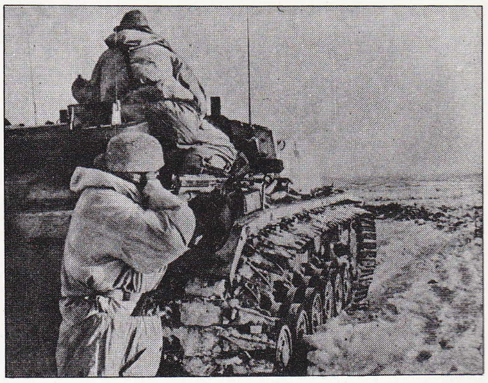




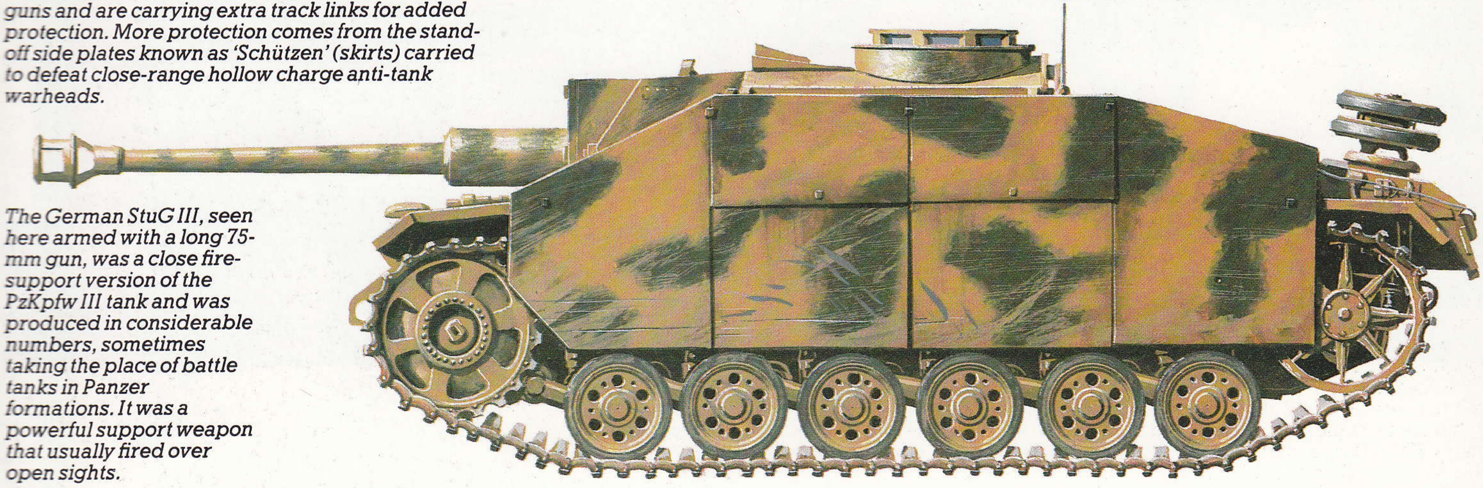
PETER SARSON & TONY BRYAN.



Two StuG III move forward in the Soviet Union in 1944. They are armed with long 75-mm anti-tank guns and are carrying extra track links for added protection. More protection comes from the stand-off side plates known as 'Schützen' (skirts) carried to defeat close-range hollow charge anti-tank warheads.



A StuG is seen on the Eastern Front against a distant target. In order to better observe the fire, one of the gun crew is using the hull roof for observation. Note that the vehicle is equipped with the wide 'Ostkette' tracks for use over snow and soft ground to improve traction.



The German StuG III, seen here armed with a long 75-mm gun, was a close fire-support version of the PzKpfw III tank and was produced in considerable numbers, sometimes taking the place of battle tanks in Panzer formations. It was a powerful support weapon that usually fired over open sights.

The trouble was that although the introduction of the StuGs made the figures look better, they were no real substitute for the tank. It lacked the full 360° gun traverse that was so essential for armoured warfare, and in an armoured action it took too much time to move into a firing position, whereupon it lacked the ability to switch from one target to another with speed and ease. If it was in the right position at the correct time the StuG could knock out an enemy tank easily enough, but to get into that place in a hurry often took too long. The only long-term result of this infusion of assault guns into the Panzer divisions was that they lost a great deal of their earlier punch and fighting edge while offering the Nazi hierarchy a false impression of combat capability. The new 'mixed' tank/StuG formations could not have the impact of 'all tank' formations, and the combat potential of the Germany army suffered as a result.

With the Panzer divisions the StuGs were often forced to adopt their original role of close fire support. An attack would commence with long-range (sometimes indirect) fire, laid down by the StuG IIIs' 7.5-cm guns on the positions to be attacked. This opening fire was usually carried out in concert with the formation's towed or self-propelled artillery batteries. As the attack moved forward the StuGs followed in the main body of armour, using their guns to reduce strongpoints such as bunkers or defended houses and to lay down covering fire as the tanks and their motorized infantry moved up to their objectives. If enemy tanks appeared the StuGs could adopt a tank-killer role, though only if the target was to the front. If an enemy tank appeared on a flank the StuGs were often sitting targets, for they infrequently had time to turn the whole vehicle to bring the gun to bear before the enemy could open fire.

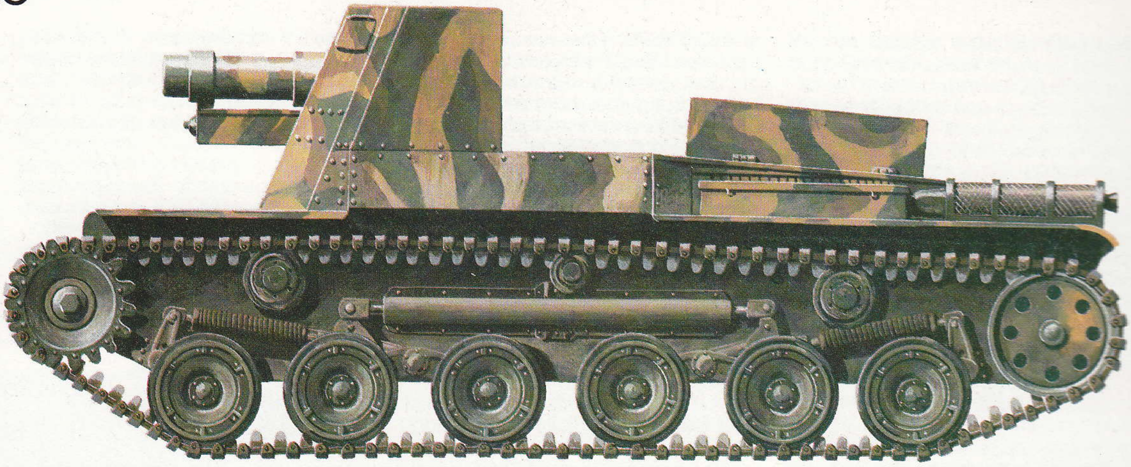
Moving into action in a StuG III cannot have been a very pleasant experience. Like those of most armoured vehicles, the interior of the StuG III was cramped and uncomfortable. Much of the interior of the main fighting compartment was taken up by the breech of the 7.5-cm gun. Ammunition racks lined the lower portion of the white-painted walls, while radios and other black boxes occupied what was left of the bulkhead space. The driver sat in his own position to the left front, most of the time peering through his armoured vision slits and trying to make out where he was going. Generally the driver was guided by orders from the commander, who sat under his cupola behind the driver. When possible the commander kept his hatch open and raised his head for better vision, but in action and closed down he could often see little more than the driver. The loader sometimes aimed and fired the 7.92-mm (0.31-in) machine-gun by controls from within the vehicle. This machine-gun was an MG34 or MG42, and when occasion allowed this was usually used from behind a shield on the roof. To the right of the commander sat the loader, who had his own overhead hatch that was seldom used in action; he also had a small hatch in the rear wall through which spent cases were despatched to avoid cluttering up the floor of the interior. Just in front of the commander and almost in his lap sat the gun layer with his gun controls. His outlook was limited to what he could see through his sighting devices: a small panoramic telescope was set in the roof for laying indirect fire and a telescope was placed in front for direct aiming.

Given the noise of the engine, the constant jolting from the suspension, and the fumes and smells of the gun and fuel, life for the StuG crews must have been very unpleasant. But they could take heart from the fact that they at least had more armour around them than most of their tankborne colleagues, and that many tank interiors were even more unpleasant and cramped than that of the StuG III.

When the war ended the StuGs were used mainly by the Panzer formations. Some StuGs had been produced specifically for use by infantry units and fitted with 10.5-cm (4.1-in) howitzers in place of the guns. But few of these were built in comparison with the StuG IIIs with 7.5-cm guns. By the time the war ended StuG III carapaces were even being fitted to surplus PzKpfw IV hulls. By 1944 the PzKpfw IV was considered to be well past its prime as a battle tank, so the production line was converted to produce yet more assault guns to join those still trying desperately to stem the advances of the Allied and Red armies. By then the Allied tide had grown to such an extent that not even heavier self-propelled weapons could stop it, but the StuG crews and their Panzer colleagues did their best right up to the end.

JAPAN

Type 4 HO-RO



Above: The Type 97 mounted a short Type 38 howitzer with limited range, but the Japanese were never able to produce the numbers required and they were mainly used in ones and twos as local fire-support weapons.

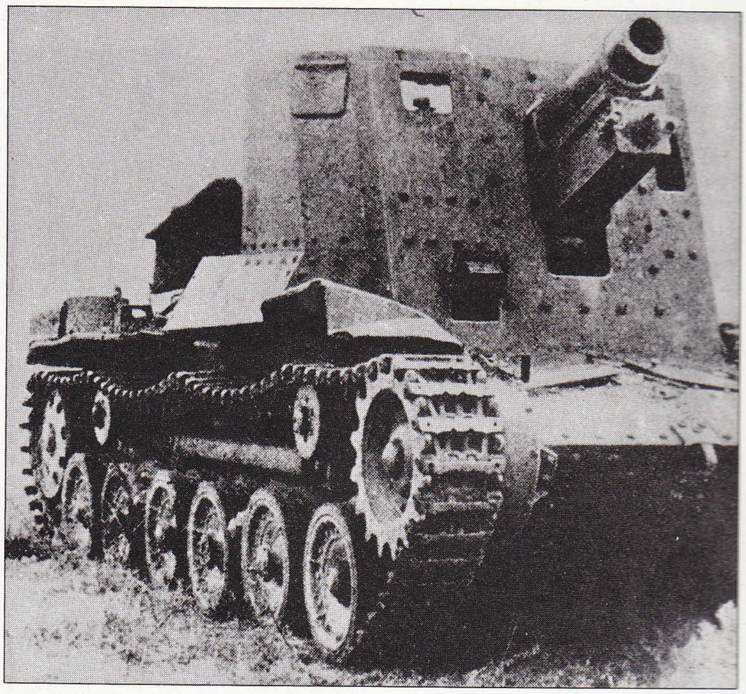
The Japanese were behind in armoured warfare development throughout all their World War II campaigns. Their early military excursions into China and Manchuria misled them into disregarding the need for heavy armoured vehicles, and instead they concentrated on what were regarded elsewhere as light tanks and tankettes. This approach was supported by the state of Japanese industry, which was still in a relatively early state of industrial development and lacked large-scale production capability. Thus it was that the Japanese army fell way behind in the development of self-propelled artillery, and ultimately only a small number of equipments were produced.

One of these was the **Type 4 HO-RO**, a self-propelled howitzer that allied the Type 38 150-mm (5.9-in) howitzer with the Type 97 medium tank. The conversion to the self-propelled role was a straightforward design task in which the howitzer was mounted in a shield which provided forward and side armour protection while leaving the top and rear open; the side armour, it is worth noting, did not extend even to the rear of the fighting compartment. The howitzer dated from 1905 and was derived from a Krupp design. It fired a 35.9-kg (79.15-lb) projectile to a range of 5900 m (6,452 yards), but most of these weapons were so old and worn that they had been withdrawn from general use after about 1942. They had a slow rate of fire as a result of the type of breech mechanism employed, but they were apparently thought good enough for the self-propelled role.

The chassis used for the Type 4 was the Type 97 CHI-HA, a medium tank by Japanese standards and dating from 1937. It was a mobile enough vehicle, but showed a relative lack of development in its thin armour, which was only about 25 mm (1 in) thick on the gun shield frontal armour, and in its overall riveted construction. The use of rivets in tank construction had elsewhere long disappeared, but the Japanese had no option but to retain the method as they lacked any other form of construction capability.

They also lacked the ability to produce the Type 4 HO-RO in anything but small numbers. Even those were virtually hand-built, with few pretensions to mass production. Even then the Japanese did not concentrate on the Type 4 HO-RO alone, for they also produced a version known as the **Type 2** mounting a 75-mm (2.95-in) gun and designed to double as a self-propelled artillery platform and a tank-killer. Again only small numbers were produced.

The Type 4 HO-RO vehicles appear not to have been organized into anything larger than four-howitzer batteries. No records survive of larger formations, and most accounts refer to these vehicles being captured or knocked out in ones or twos. Very often they were assigned for island defence in the amphibious campaign leading to the Japanese mainland, and only a few were captured intact.



The Type 97 had its 150-mm howitzer mounted in place of the turret normally carried. The howitzer was meant to be used as a form of mobile field artillery but was normally used as close support artillery.

Specification

Type 4 HO-RO

Type: self-propelled howitzer

Crew: 4 or 5

Weight: not recorded, but about 13600 kg (29,982 lb)

Powerplant: one V-12 diesel developing 126.8 kW (170 hp)

Dimensions: length 5.537 m (18 ft 2 in); width 2.286 m (7 ft 6 in); height to top of shield 1.549 m (5 ft 1 in)

Performance: maximum road speed 38 km/h (23.6 mph)

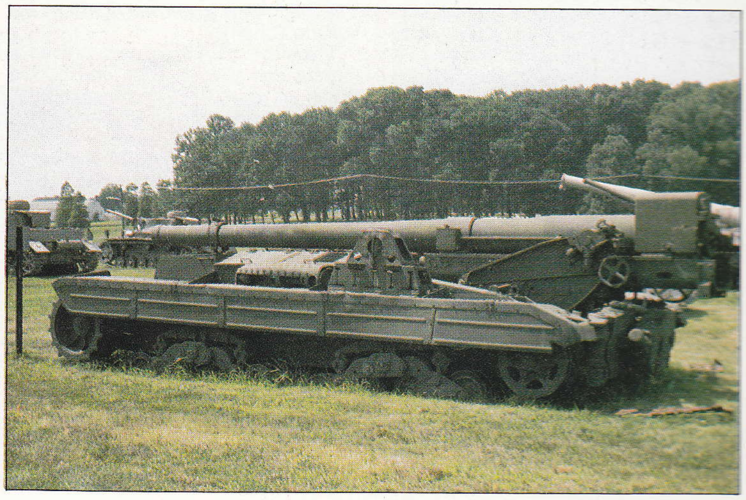
Armament: one 150-mm (5.9-in) howitzer

ITALY

Semovente da 149/40

The Italian army was not far behind the Germans in realising the need for assault guns, and developed a string of vehicles that outwardly resembled the German StuG III. These Italian assault guns were produced in appreciable numbers, for they were better armoured and in relative terms quicker to produce than contemporary Italian tanks. But by the time significant numbers had been issued Italy was effectively out of the war, and most of these Italian assault guns fell into German hands.

The majority of Italian self-propelled weapons, known as *semovente*, mounted 75-mm (2.95-in) or 105-mm (4.13-in) guns and howitzers of varying lengths, but since these were direct-fire mounts the Italian artillery arm still required self-propelled artillery weapons to support the armoured formations. Accordingly Ansaldo diverted some of its precious development facilities to design a powerful artillery weapon that could be carried on a trucked chassis. In the end Ansaldo plumped for an existing weapon, the long Canone da 149/40 modello 35, and decided to place it on a much-modified Carro Armato M.15/42 tank chassis. The selection of these two items of equipment was made in order to produce as good a carriage/weapon combination as possible, but the snag was that the Italian army was already



The long, lean lines of the Italian 149/40 can be seen at the Aberdeen Proving Grounds in Maryland, USA, still looking very serviceable as a modern artillery weapon despite the lack of crew protection and stowage on the vehicle for ammunition and other items.

Semovente da 149/40 (continued)

crying our for large numbers of both the gun and tank. Italian industry quite simply could not keep up with the existing demands and so the new self-propelled weapon, known as the **Semovente da 149/40**, got off to a shaky start.

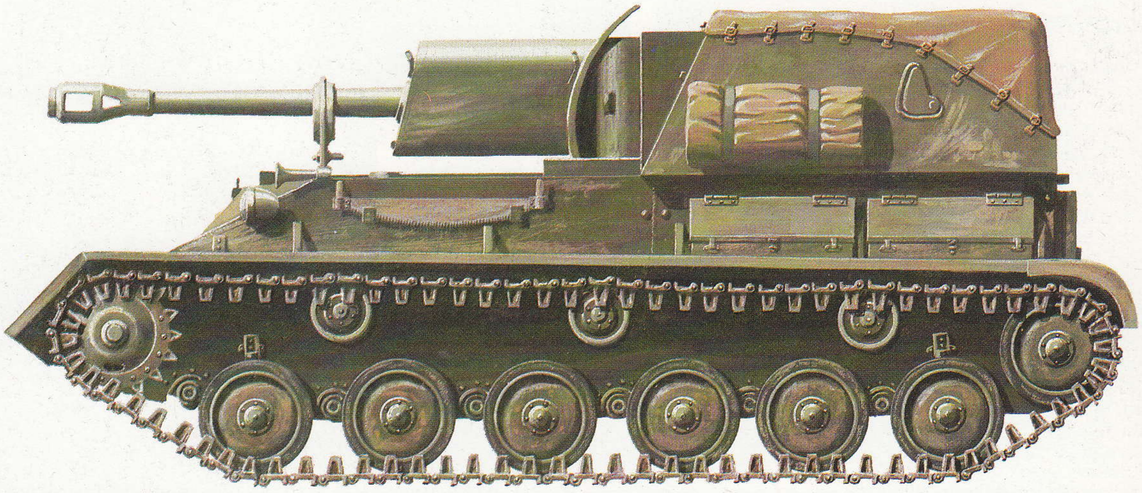
The Semovente da 149/40 was a completely unprotected weapon as the long gun barrel was placed on an open mounting carried on the turretless tank chassis. The gun crew stood in the open to serve the gun, which had its trunnions mounted right to the rear to absorb some of the recoil forces produced on firing. It was late 1942 before the first prototype was ready for prolonged firing trials, but even before these were over unsuccessful attempts were being made to start production. Before the lines could start rolling the Italians surrendered to the Allies, and the Germans took over what was left of the Italian economy. Thus the Semovente da 149/40 prototype remained the sole example of what seemed to be a promising design. The gun of the Semovente da 149/40 was certainly a useful weapon: it could fire a 46-kg (101.4-lb) projectile to a range of 23700 m (25,919 yards), at which distance the lack of protection for the gun crew would have been of relatively little importance.

The prototype survived the war, and can now be seen at the Aberdeen Proving Grounds in the USA. It still looks a thoroughly modern piece of equipment that would not be too out of place in many modern gun parks.

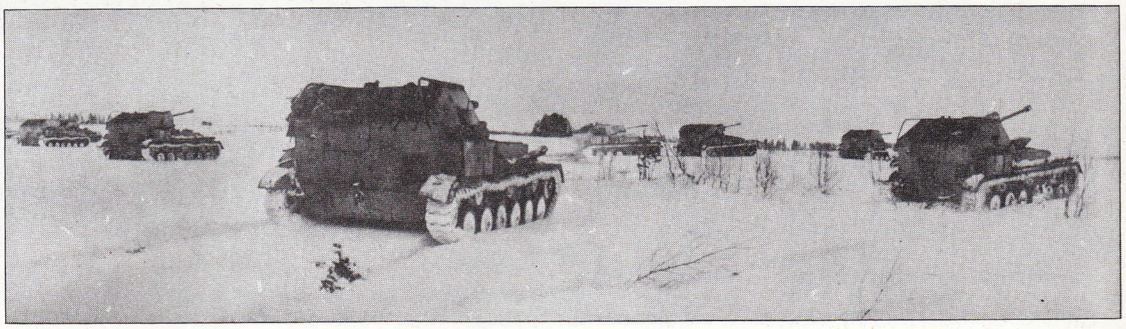
Specification
Semovente da 149/40
Type: self-propelled gun
Crew: (on gun) 2
Weight: 24000 kg (52,911 lb)
Powerplant: one SPA petrol engine developing 186.4 kW (250 hp)
Dimensions: length 6.60 m (21 ft 7.8 in); width 3.00 m (9 ft 10 in); height 2.00 m (6 ft 6.7 in)
Performance: maximum road speed 35 km/h (21.75 mph)
Armament: one 149-mm (5.87-in) gun

USSR

SU-76



The Soviet SU-76 was a wartime and rather rushed conversion of the T-70 light tank to carry a 76-mm field gun, and although it was produced in large numbers it was little liked by its crews, who called it the 'Bitch'.



SU-76s wait to take part in one of the massive artillery actions that usually took place before any major Red Army action. The open structure of the SU-76 must have made life very uncomfortable for their crews under such conditions, as only tarpaulin covers were carried.

During the desperate days of 1941 the Red Army lost so much materiel that Soviet planners were forced to list mass production as their top priority, and in order to cut down the numbers of equipments being produced only a few types were selected for future use. One of these types was the superlative ZIS-3 76.2-mm (3-in) gun, which was not only an excellent field piece but at that period also a good anti-tank gun. Thus when it was decided to adopt the ZIS-3 in quantity the Red Army had a very good weapon for the future, especially when the chance arose to make the weapon a self-propelled one.

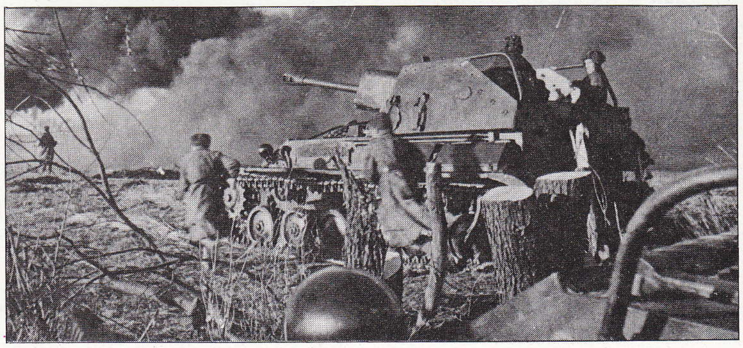
The events of 1941 had shown the Red Army that its light tanks were virtually useless, and the type was scheduled for withdrawal from production and service. A production line was in existence for the T-70 light tank, however, and it was decided to convert the T-70 to take the ZIS-76 gun as a highly mobile anti-tank weapon. Thus was born the **SU-76** (SU for *Samokhodnaya Ustanovka*, or self-propelled mounting). The conversion to take the 76.2-mm gun and 62 rounds of ammunition was a simple one, but the T-70 chassis had to be widened somewhat and an extra road wheel was added to take the extra weight. The first examples had the gun mounted centrally, but later models had the gun offset to the left. Maximum armour thickness was 25 mm (0.98 in).

It was late 1942 before the first SU-76s were produced, and it was mid-1943 before they were in Red Army service in any appreciable numbers. By that time the ZIS-3 gun had lost much of its edge against the ever-thickening German tank armour, and thus the Su-76 was gradually phased over to the direct fire-support of Red Army infantry formations. Some anti-tank capability was retained when new anti-armour ammunition was introduced, but by the end of the war the SU-76 was being phased out in favour of vehicles with larger-calibre guns. Many SU-76s were pressed into other roles by 1945. The usual process was to remove the gun and then use the vehicle as a supply and ammunition carrier, as an artillery tractor and as a light armoured recovery vehicle. Some were fitted with anti-aircraft cannon.

After 1945 there were still many SU-76s to hand, and the Soviets handed them on to many friendly nations including China and North Korea, with whom the type saw another bout of action during the Korean War that started in 1950. More went to some of the Warsaw Pact armed forces. It is doubtful that the new recipients welcomed the SU-76, for it was very much a wartime expedient vehicle with no crew comforts whatsoever. Apart from a few examples that had an armoured roof, the crew compartment of the SU 76 was open to the elements and the driver had to sit next to the twin engines with no intervening bulkhead. The Red Army knew the SU-76 as the *Sukami* (bitch).

Thus the SU-76 started life as a mobile anti-tank weapon and ended up as an artillery support weapon. It was no doubt a very useful weapon in the latter role, but essentially it was a hasty expedient rushed into production at a time of desperate need. Surprisingly, the type may still be encountered in odd parts of the world.

Specification
SU-76
Type: self-propelled gun
Crew: 4
Weight: 10800 kg (23,810 kg)
Powerplant: two GAZ 6-cylinder petrol engines each developing 52.2 kW (70 hp)
Dimensions: length 4.88 m (16 ft 0.1 in); width 2.73 m (8ft 11.5 in); height 2.17 m (7 ft 1.4 in)
Performance: maximum road speed 45 km/h (28 mph); road range 450 km (280 miles); fording 0.89 m (2 ft 11 in)
Armament: one 76.2-mm (3-in) gun and one 7.62-mm (0.3-in) machine-gun



Red Army soldiers attack under the close supporting fire of SU-76 76-mm guns, providing a graphic example of what close-range artillery support really means. By 1945 the SU-76 was used almost exclusively in this role after being used at one point as mobile field artillery.

USSR

ISU-122 and ISU-152

The first of the heavy Soviet self-propelled artillery carriages was the **SU-152**, which first appeared in 1943, just in time to take part in the tank battles at Kursk. It was built onto a KV-2 heavy tank chassis and was typical of later World War II designs in that the tank chassis was taken virtually unchanged and a large armoured box was built on to the front of the hull. The weapon was a 152-mm (6-in) M-1937 howitzer mounted in a large and heavy mantlet on the front superstructure plate and there were roof hatches, one of which had provision for mounting an anti-aircraft machine-gun. This first vehicle was intended for use as much as an anti-armour weapon as a heavy assault weapon, for the Red Army made no differentiation between anti-tank and other weapons when it came to tactics. The SU-152 relied upon sheer projectile weight and power to defeat enemy armour.

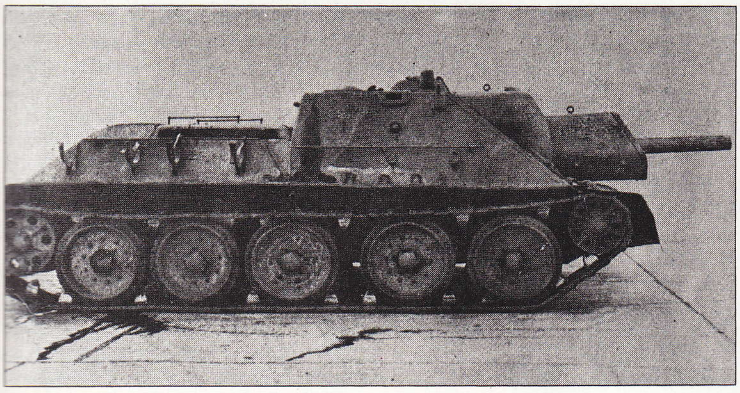
When the KV tank series was replaced in production by the IS series, these too were used for the SU self-propelled role. The conversion followed closely that of the original SU-152, and the IS-based conversion was originally known as the **ISU-152**. To the average observer the SU-152 and ISU-152 were visually identical, but the ISU-152 mounted a more modern howitzer known as the ML-20S (with 20 rounds), technically a gun-howitzer and a very powerful weapon, especially at the assault ranges favoured by Red Army tactics. The weapon was protected by an armoured box made up from sloping plates of thick armour, with hand rails around the edge of the roof for use by 'tank descent' infantry who used the vehicles to carry them into action. Maximum armour thickness was 75 mm (2.95 in).

The ISU-152 was joined by the **ISU-122**, a virtually identical vehicle carrying a powerful 122-mm (4.8-in) gun known as the M-1931/4 or A-19S (with 30 rounds), the ordnance being a modification of the then-standard 122-mm M-1931/37, though there was also another gun known as the D-25S which was ballistically identical to the A-19S but differed in the way it was constructed. Numerically the ISU-122 was less important than the ISU-152, but the 122-mm version was potentially the more powerful weapon as it fired a higher-velocity projectile than the heavier 152-mm weapon, which relied more upon shell weight for its effects.

During 1944 and 1945 the ISU-152 and ISU-122 were in the vanguard of the Red Army advances through Germany towards Berlin. Some of the first Red Army units entering Berlin were ISU-152 units, which used their howitzers to blast away strongpoints at close ranges and clear the way to the remains of the city centre.

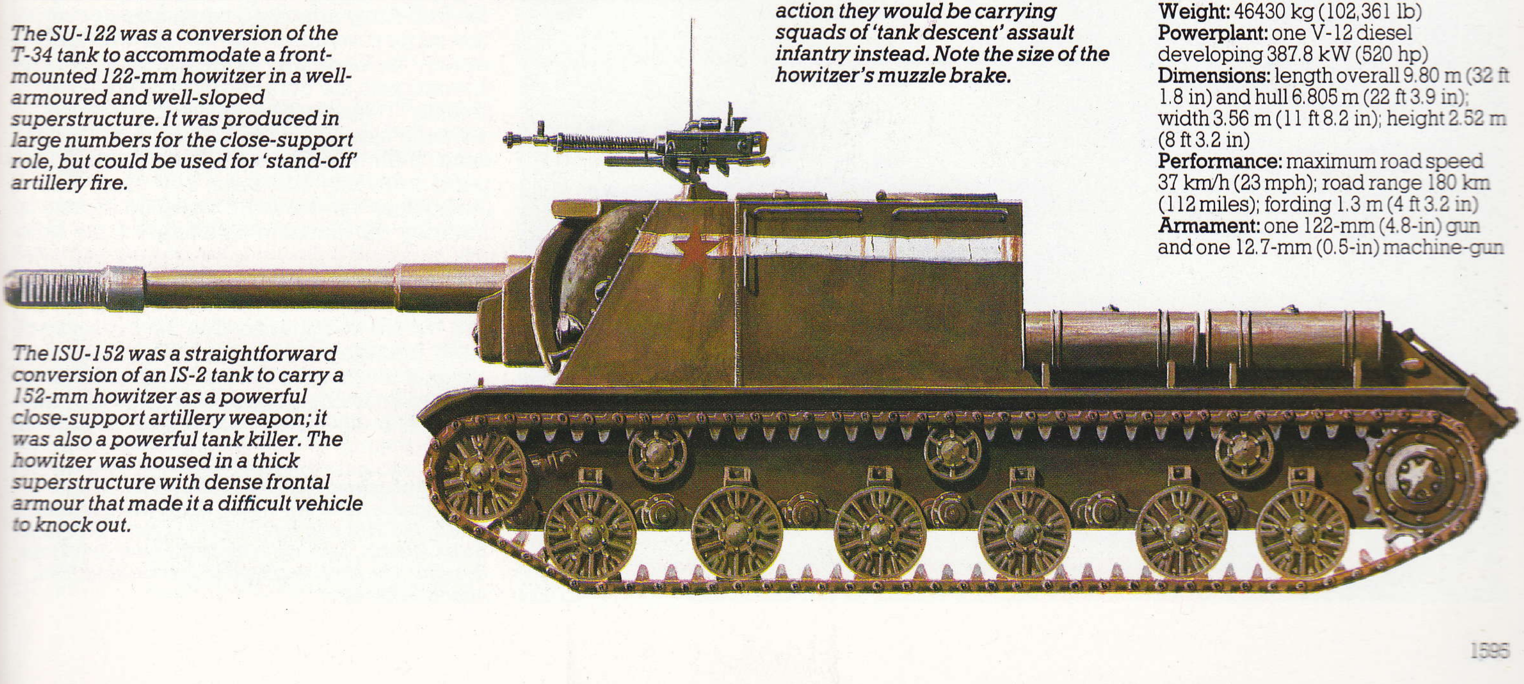
If the ISU weapons had a fault it was that they lacked internal ammunition stowage space. Thus they had to have a virtual constant supply of ammunition brought foward by armoured carriers, which was often a hazardous undertaking. But the massive weapon carried by the ISU vehicles was considered to be of great value in the direct support of Red Army tank and motorized infantry divisions, and both types went on to be used for some years after the war.

ISU-152s were still in front-line service in 1956 when the Red Army ruthlessly crushed the Hungarian uprising. In the streets of Budapest the lack of traverse proved a serious disadvantage. The gun mechanism was never modernized; elevation and loading were done by hand.



The SU-122 was a conversion of the T-34 tank to accommodate a front-mounted 122-mm howitzer in a well-armoured and well-sloped superstructure. It was produced in large numbers for the close-support role, but could be used for 'stand-off' artillery fire.

An ISU-152 crosses a river during the latter stages of World War II. These vehicles appear to be carrying their crew members on the roof, but in action they would be carrying squads of 'tank descent' assault infantry instead. Note the size of the howitzer's muzzle brake.



The ISU-152 was a straightforward conversion of an IS-2 tank to carry a 152-mm howitzer as a powerful close-support artillery weapon; it was also a powerful tank killer. The howitzer was housed in a thick superstructure with dense frontal armour that made it a difficult vehicle to knock out.

Specification

ISU-122

Type: self-propelled assault gun

Crew: 5

Weight: 46430 kg (102,361 lb)

Powerplant: one V-12 diesel developing 387.8 kW (520 hp)

Dimensions: length overall 9.80 m (32 ft 1.8 in) and hull 6.805 m (22 ft 3.9 in); width 3.56 m (11 ft 8.2 in); height 2.52 m (8 ft 3.2 in)

Performance: maximum road speed 37 km/h (23 mph); road range 180 km (112 miles); fording 1.3 m (4 ft 3.2 in)

Armament: one 122-mm (4.8-in) gun and one 12.7-mm (0.5-in) machine-gun

Guns of the Allies

Apart from Germany, the greatest exponents of self-propelled artillery were the Russians, who produced excellent vehicles in vast numbers. The British had to start from scratch, as did the USA, but the latter proved faster at producing a viable design.

It may seem strange to regard the Allies and the Soviets separately for the years between 1939 and 1945, for from 1941 onwards they were allied against the common German foe; but such was the isolation of the Soviet Union during much of the war that the Soviets can be considered as being militarily distinct for most practical purposes. Soviet armour development and its equivalent among the 'Atlantic' nations proceeded along entirely separate lines, and from different motivating factors. Thus although the Soviets and the Western Allies both produced self-propelled artillery, their products were quite different.

To start with the Soviet standpoint, it must be realized that armoured warfare had always featured large in Soviet long-term planning. From 1917 onwards the Red Army had been regarded as the vanguard of the Revolution and the missionary element that was to take the Soviet form of socialism to all corners of the earth, so it had to be equipped to carry through the class struggle. Amongst other factors, this meant for the Red Army planners the use of armoured warfare on a large scale. Over the USSR's early years this armoured ideal was sought but remained unrealized, for the simple reason that the decades after the Revolution were beset by international power struggles and by the problems associated with the upgrading of Soviet industry to a pitch where it could supply the weapons required for the forthcoming struggle. These strictures had several important results. One was a form of tactical and design orthodoxy that would not offend leaders' sensibilities or demand so many innovations that large-scale production of hardware would be slowed. Instead a steady programme of evolutionary development was adopted, whereby one established design was used as the basis for another, and mass production was channelled to accept such changes without any major disruption of production totals and norms. Thus Soviet armour designs tended to be strictly orthodox and based on a system of evolutionary change rather than a succession of new designs, one after another.

Self-propelled artillery had a place in Red Army philosophy from its earliest days. Soviet military leaders were thinking in terms of tank armies while planners in the West were tinkering with cardboard tanks and small numbers of tankettes. Fortunately for the West, Soviet industry was still in a formative stage during that period, but by the end of the 1930s armour was flowing from the newly-instituted production lines in an increasing torrent. Among these products were early attempts at self-propelled artillery. Many of these early design efforts were little more than design studies, for as a rule most Soviet tanks carried larger guns than their Western counterparts. They were usually simple conversions of existing tank chassis to carry pieces of ordnance already in production. Only one form of artillery on tracks got into production at this period and this demonstrated, for all its faults, the thinking that influenced Soviet self-propelled artillery design.

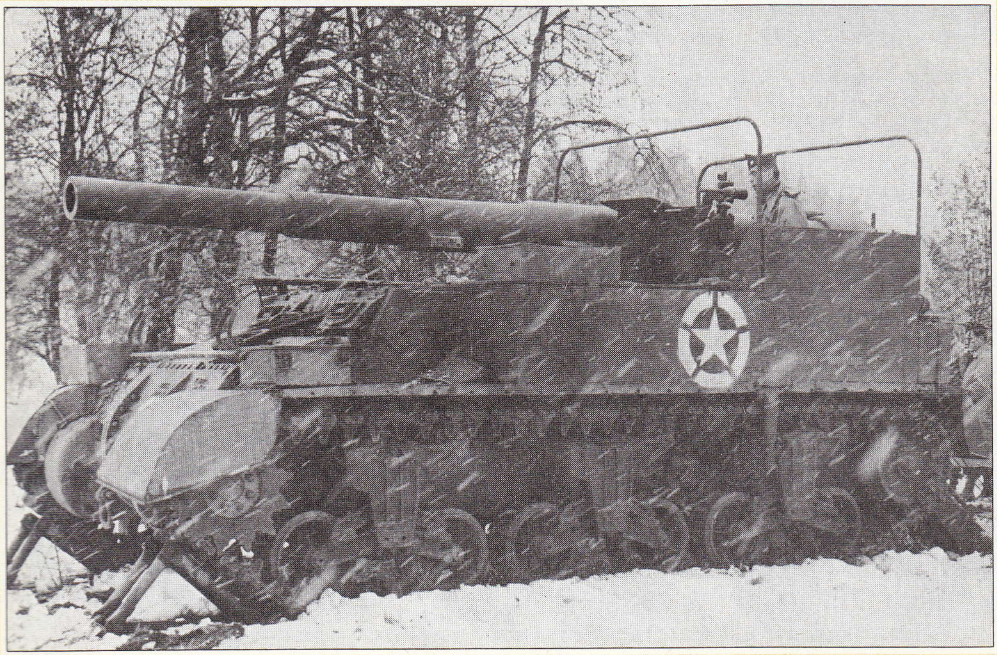
The weapon was the KV-2, which was in many respects a cross between a heavily-armed tank and a close-support assault weapon. The KV-2 carried a short 152-mm (6-in) howitzer in a large slab-sided rotating turret. Known to its crews as the 'dreadnought', the KV-2 was intended to move forward with other tanks and supply direct supporting fire at close ranges. This concept of heavy weapons employed well forward was to recur in later designs, and although later weapons were sometimes capable of indirect fire, Soviet self-propelled artillery was generally used in the direct-fire role and at the close ranges that demanded heavy protective armour for crew and weapon survival.

The KV-2 was not a success as its awkward and bulky turret made it an easy target during its main period of action, the campaign following the German invasion of 1941. During this invasion the Soviet Union lost nearly all its main industrial base in European Russia, together with many sources of strategic raw materials. What industrial potential there that remained in Soviet hands was uprooted and shifted at enormous physical cost to areas east of the Urals, where they were simply dumped and told to resume production. This disruption led to a drastic intensification of production priorities and aims: a stringent programme of choosing only a relatively few end products was imposed so that industry could concentrate on massive production of those alone; no diversion was possible. Ammunition supply followed the same lines to the extent that only a few calibres were selected for front-line use, so that production and logistic supply were made as easy as possible. In the field of armour the same policy was followed, although existing production vehicles and lines were retained. Thus the KV tank series remained in manufacture and the T-70 light tank lines were revised to produce the far more useful SU-76, but the main concentration was on the new T-34 tank, which also became the basis for one of the Red Army's most important self-propelled artillery weapons.

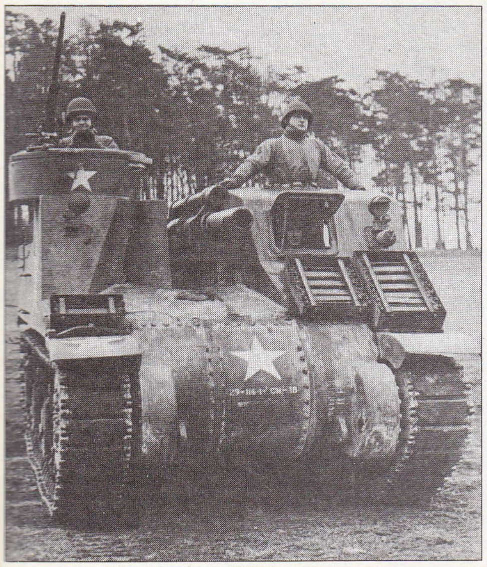
The crew of an SU-122 looks out for a potential target. The thick armour of the 122-mm howitzer mantlet is evident, along with the rather rough (but adequate) standard of finish of many Soviet weapons. The howitzer used was a modification of a standard field piece.

This was the SU-122, a T-34 tank altered to carry a 122-mm (4.8-in) howitzer in a well-sloped superstructure. It could be produced with relative ease on the T-34 lines, and it gave the Red Army armoured formations a powerful fire-support weapon. The SU-122 was used in exactly the same way as the earlier KV-2: well forward with the front waves of attacking tanks (usually T-34s) to blast away strongpoints or anything else that stood in the way of the advance. If an SU-122 broke down it could take parts from any disabled T-34 tank, and if ammunition ran out more could be picked up from any 122-mm howitzer battery in the vicinity.

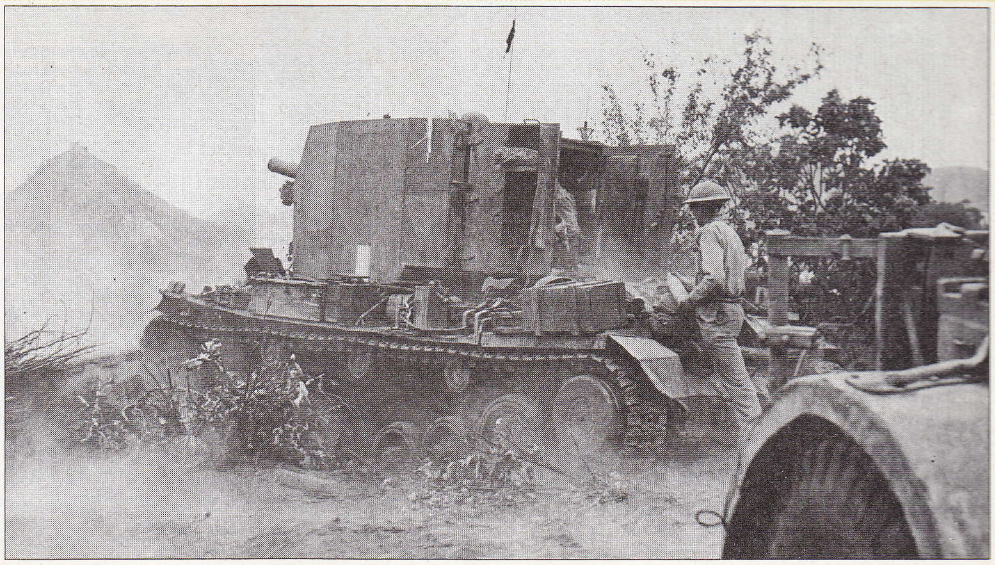
The SU-122s were usually organized within regiments that contained two SU-122 batteries and two SU-76 batteries. The SU-76 was originally intended to be a stop-gap anti-tank weapon mounting a 76-mm (3-in) gun, but increases in German tank armour gradually relegated it to the close-support role. The SU-76



An M12 chocked securely in place with the rear firing spade lowered. The US Army was reluctant to take the M12 into service at first, but it proved to be invaluable, leading to the many later American designs. The M12 remained in service until 1945, mainly in Europe.



A parade-ground shot of an early M7, recognizable by the three-piece hull front – later models used a one-piece casting. The boxes on the hull in front of the driver's position were for spare track links.



A Bishop is seen in action during the latter stages of its operational career, close to Naples. The gun number is passing ammunition into the gun turret after taking it from ammunition limbers, one of which can be seen in the foreground and normally towed behind the vehicle when on the move.

and the SU-122 had one thing in common, and that was that they made no concessions whatsoever to crew comfort or convenience. Their crews went into action in vehicles that were roughly but adequately finished and inside or behind armour that was usually poorly ventilated, cramped and generally uncomfortable. Little consideration was given to access to ammunition lockers or to ease of handling, as the overwhelming need for mass production made such apparent luxuries unthinkable.

This trend continued with the SU-152 on the KV tank chassis (mounting a 152-mm/6-in howitzer) and the later ISU-152 (and its close counterpart the ISU-122) based on the IS tank chassis. The ISU-122 was produced mainly because there were stocks of 122-mm high-velocity guns ready to hand.

With these few vehicle and weapon combinations the Red Army carried the war into the heart of Germany by 1945. None of the vehicles used in the self-propelled artillery role was anything other than a modification of a vehicle already in mass production, and the number of types was kept as small as overall production totals were enormous.

The Western Allies

By contrast with the Soviets, the Western Allies were ill-organized for war. A long lapse into political thinking that regarded future wars as at best unlikely led their treasuries into releasing only limited defence funding, and as a result very little armoured warfare development was carried out in either the USA or the United Kingdom during the 1920s and 1930s. The British army did make a tentative stab at developing self-propelled artillery with the Birch Guns during the late 1920s, but the effort came to nothing when the money ran out. What later became the Western Allies did make great steps towards mechanization, to the point where the little BEF that went to France in 1939 was the only fully-mechanized component of all the Allied forces facing Germany. But the artillery was still towed, albeit behind mechanized tractors. Self-propelled artillery did not feature at all in the armies of 1940, apart from a few World War I weapons still in use by the French.

The campaign of May 1940 changed all that. The Panzer divisions swept across France and demonstrated the catastrophic arrival of a new concept of warfare, based on the tank. But if the future pace of warfare was to be dictated by the tank, it was abundantly clear that all other arms had to keep up with them, and that included the artillery. For the British army during the days after Dunkirk sheer survival and re-equipment were the paramount factors, and matters such as new forms of artillery had to wait.

The USA started war production for the British and French during early 1940, but the nation deluded itself that it could remain aloof from events across the oceans until Pearl Harbor inflicted the awful truth. The USA then perforce entered the war, and the world's mightiest industrial nation swung into action almost overnight. Within weeks tank and weapon factories were being built all over the nation, even though it had not been decided what form or type of weapons were to be produced in them. Before long new types of tank were flowing off the brand-new lines, though it soon became obvious that good as some of these new designs were, they lacked any form of long-term design or tactical experience for guidance: by 1941 the Soviet Union and Germany were already mass-producing tanks from scratch, whereas the USA was at the stage of virtually hand-building test prototypes. Thus compared with many contemporary German or Soviet designs, some of the early American equipments were undergunned and overengineered, but they had the priceless advantage that they were available in potential masses.

The first Allied attempt at self-propelled artillery came from the USA, where World War I 75-mm (2.95-in) guns were placed on half-tracks and rushed into service of a sort, although none saw other than limited action. A British equivalent (in awkwardness if not calibre) was the odd 25-pdr Bishop, which equalled many of the later German lash-ups in strange appearance and lack of tactical utility, as when it was first mooted no one could decide if it was to be a heavy-gun tank or self-propelled artillery. The Bishop was the only type of British self-propelled artillery to see service before the end of the war, for thereafter the British gunners relied on the output of Sextons from the Canadian factories and numbers of American weapons, especially the M7, known to the British as the Priest.

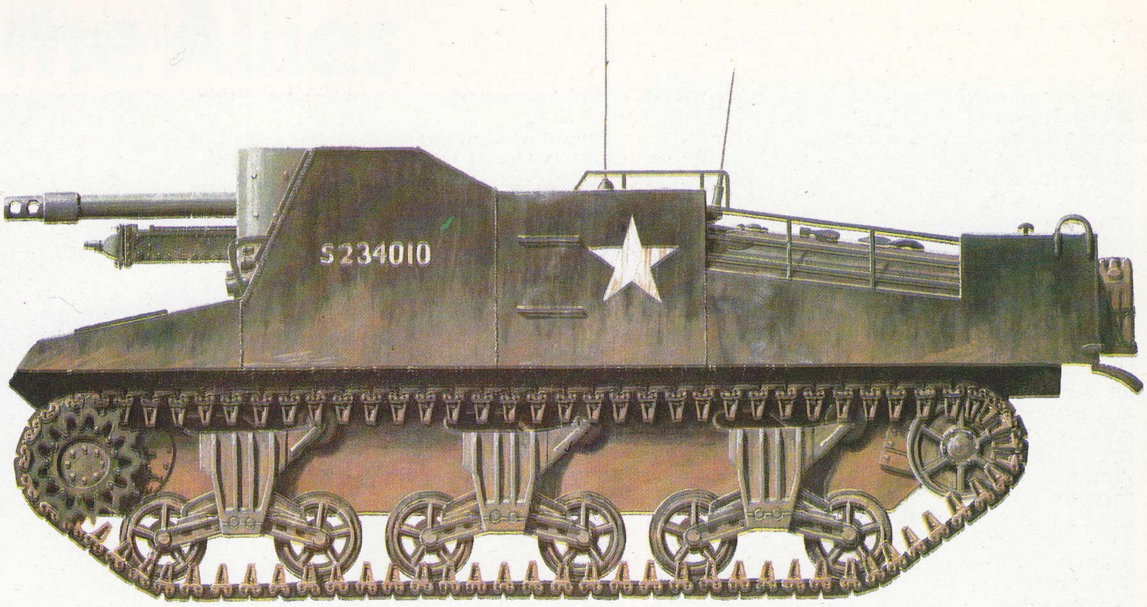
The M7 was the outcome of an earlier American programme in which a 105-mm (4.13-in) howitzer was placed on a halftrack and designated T19. (The earlier 75-mm halftrack was the T12.) These saw service during the Tunisian campaign, in which they were joined by the M7 Priest. Built on the M3 medium tank chassis (and later the M4) the M7 was a great success and carried a 105-mm howitzer. Although it had been manufactured using an existing chassis, the M7 used spare production potential as it appeared at a time when the M3 was being phased out, and it differed in many ways from its Soviet equivalant.

First there was the tactical role that the M7 was supposed to play: whereas the Soviet weapons were supposed to produce direct close-up supporting fire, the M7 and the later Allied designs were designed to act as truly mobile pieces of field artillery for long-range indirect fire, and as such played no direct part in assault or close combat. Neither did they have an anti-tank role, although if a target presented itself it was usually engaged. Thus the armour of the M7 was much lighter than the essential carapaces of the Soviet assault guns. The M7 and its close Canadian counterpart had only light front and side armour and no overhead cover at all.

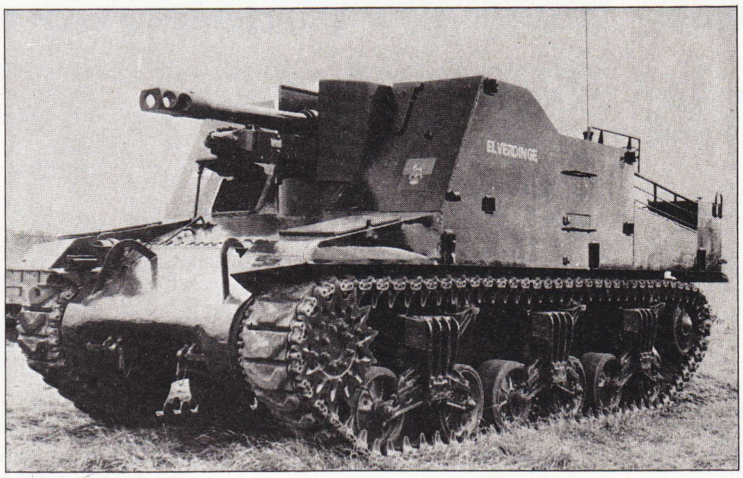
The M7 was just one of many American self-propelled artillery designs. A listing of all the prototypes and trial models produced by the Americans would cover pages, and few of them ever got past the 'one-off' stage. But they all had one thing in common, apart from the purely anti-tank versions, in that they were all intended only for the indirect-fire role. They were nearly all superbly produced and detail engineering reached down as far as crew comforts. So there cannot be any close comparison between Soviet and Western designs: they were the results of different concepts of production thinking, and in the end were used for wholly different tactical purposes.

CANADA

Sexton



Above: The Sexton mounted the British 25-pdr gun and was a well-liked and reliable vehicle that served on for many years after World War II with many armies. It is still used by India.



This Sexton is now a preserved 'runner' maintained by the Royal School of Artillery at Larkhill, Wiltshire. It originally came from Portugal, where it was sent during the years after 1945.

During early 1941 the British Purchasing Commission in Washington asked the Americans if the M7 Priest could be altered to allow it to carry the British 25-pdr (87.6-mm/3.45-in) gun-howitzer. While the British appreciated the amenities of the M7 Priest, it had the major disadvantage of mounting a 105-mm (4.13-in) howitzer that was not a standard British weapon calibre at that time. The Americans accordingly produced the M7 with the 25-pdr and named it the T51, but at the same time announced that there was no way that they could produce it in quantity as they had their production hands full already. The British accordingly looked around and noted that the Canadians had set up a production line for the Ram tank, a type that was soon to be replaced by the American M3 and M4. The Ram was accordingly altered to accommodate the 25-pdr, and thus was born the **Sexton**.

The Sexton used the overall layout of the M7 Priest, but many changes were introduced to suit British requirements. These included the movement of the driver's position to the right-hand side. The Sexton lacked the pronounced 'pulpit' of the M7, but the fighting compartment was left open with only a canvas cover to provide weather protection for the crew. The Sexton had a crew of six, and much of the interior was taken up with lockers for ammunition and some of the crew's personal kit; more stowage was provided in boxes at the rear. Maximum armour thickness was 32 mm (1.25 in).

The 25-pdr gun-howitzer was carried in a special cradle produced by the Canadians specifically for the Sexton. This allowed a traverse of 25° left and 40° right, which was very useful for the anti-tank role (18 AP rounds) but in the event the Sexton had little need of this facility. Instead it was used almost exclusively as a field artillery weapon (87HE and smoke rounds) supporting the armoured divisions in North West Europe from 1944 onwards. There were several variations, all of them incorporating the production changes progressively introduced on the lines of the Montreal Locomotive Works at Sorel. Production continued there until late 1945, by which time 2,150 Sextons had been manufactured.

The Sexton was a well-liked and reliable gun and weapon combination that proved so successful that many are still in use in odd corners of the world to this day. The British army used the type until the late 1950s, and one is preserved as a museum piece at the Royal School of Artillery at Larkhill in Wiltshire.

There were a few in-service variants of the Sexton, some being converted to 'swim' for possible use on D-Day, but none appear to have been used in this role on the day. A more common conversion was the replacement of the gun-howitzer by extra map tables and radios in the **Sexton Gun Position Officer** command vehicle; there was usually one of these to a battery. In post-war years some Sextons were handed over to nations such as Italy who preferred the 105-mm (4.13-in) howitzer; in this instance the 25-pounders were replaced with German 105-mm howitzers.

Specification

Sexton

Type: self-propelled gun-howitzer

Crew: 6

Weight: 25855 kg (57,000 lb)

Powerplant: one Continental 9-cylinder radial piston engine developing 298.3 kW (400 hp)

Dimensions: length 6.12 m (20 ft 1 in); width 2.72 m (8 ft 11 in); height 2.44 m (8 ft 0 in)

Performance: maximum road speed 40.2 km/h (25 mph); road range 290 km (180 miles); fording 1.01 m (3 ft 4 in)

Armament: one 25-pdr gun-howitzer, two unmounted 7.7-mm (0.303-in) Bren Guns and (on some vehicles) one pintle-mounted 12.7-mm (0.5-in) Browning machine-gun

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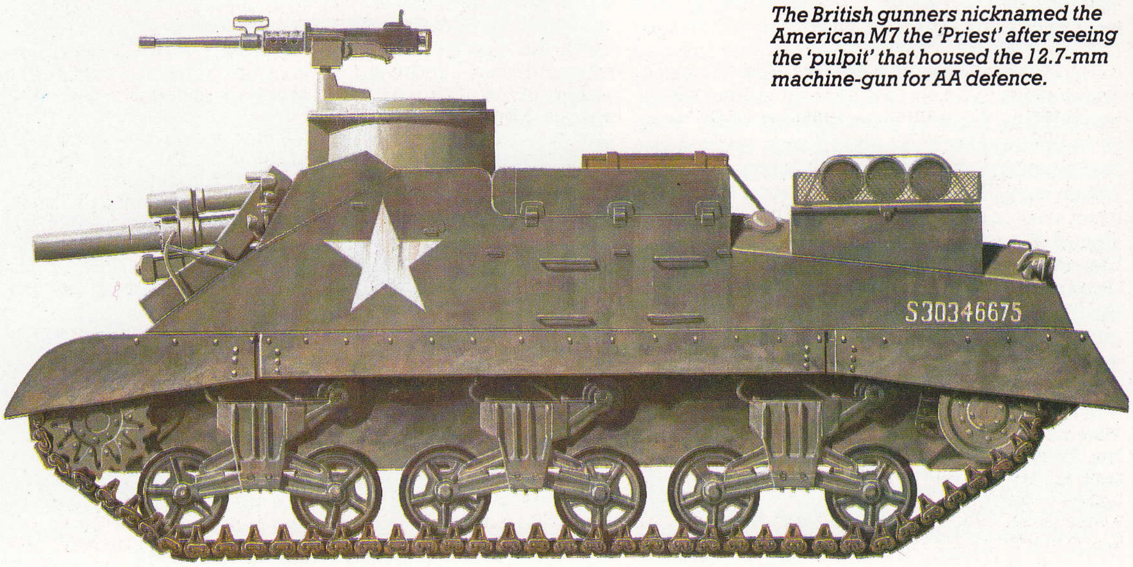
USA

M7 Priest



The British gunners nicknamed the American M7 the 'Priest' after seeing the 'pulpit' that housed the 12.7-mm machine-gun for AA defence.

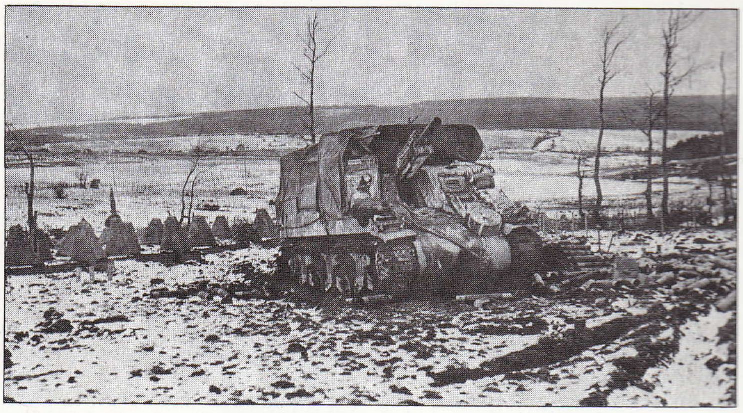
Experience gained with 105-mm (4.13-in) howitzers mounted on halftracks enabled the US Army to decide that it would be better if the howitzer was mounted in a fully tracked carriage, and accordingly an M3 medium tank chassis was modified to take such a weapon. The M3 chassis was considerably reworked to provide an open-topped superstructure with the howitzer mounted in its front. The development vehicle was known as the **T32**, and following trials which added a machine-gun mounting to the right-hand side of the fighting compartment, the vehicle was adopted for service as the **Carriage, Motor, 105-mm Howitzer, M7**. Maximum armour thickness was 25.4 mm (1 in).

The first production examples were for the US Army, but many were soon diverted to the Lend-Lease programme for the Allies, among them the British Army. The British soon named the M7 the **Priest**, legend having it that the prominent machine-gun mounting gave the impression of a pulpit. The British gunners adopted the M7 with alacrity, and the type first went into action with them at the 2nd Battle of El Alamein in October 1942. The British asked for 5,500 M7s to be produced for their use alone by the end of 1943, but this order was never completed in full. The figure nonetheless provides an indication of the success of the M7 with the British gunners. They appreciated the space and mobility of the carriage and also the extra space for personal stowage. The one snag was the howitzer, which was not a standard British Army type: thus ammunition (stowage was provided for 69 rounds on each vehicle) had to be supplied separately for the M7 batteries, which made for a considerable logistic complication. This was not resolved until the first Sextons with the 25-pdr weapons began to be issued in 1944. Until that time the British M7s were used all through the Italian campaign, and some were landed in Normandy in June 1944 though they were soon replaced by Sextons.

The M7 then began a new service career in a revised form: the howitzers were removed and the hulls were used as armoured personnel carriers nicknamed Kangaroos. This soon became a normal fate for unwanted M7s, and the idea soon spread to Italy.

The US Army also made wide use of the M7, although production for the US Army was not a constant process. After 1942 M7 production proceeded in fits and starts. At one stage the original M3 chassis was replaced by the later M4A3 Sherman chassis, and these M7s were known by the designation **M7B1**.

After 1945 large numbers of M7s were handed over to other countries, and some remain in use to this day in such nations as Brazil and Turkey. The 105-mm howitzer is still a standard weapon all over the world, and thus the M7s continue to fire a 14.97-kg (33-lb) shell to a range of 11430 m (12,500 yards). Throughout their service life the M7s have always showed outstanding reliability, and have demonstrated their ability to cross all types of rough terrain.



An M7 in action in the Ardennes, 1945, with the open fighting compartment covered by a tarpaulin to keep out the worst of the bitter weather. The tank obstacles behind the M7 are part of the infamous Siegfried Line defences that in the event were taken without too much trouble.

Specification
M7

Type: self-propelled howitzer
Crew: 5
Weight: 22967 kg (50,634 lb)
Powerplant: one Continental 9-cylinder radial piston engine developing 279.6 kW (375 hp)
Dimensions: length 6.02 m (19 ft 9 in); width 2.88 m (9 ft 5.25 in) height 2.54 m (8 ft 4 in)
Performance: maximum speed 41.8 km/h (26 mph); maximum road range 201 km (125 miles); fording 1.219 m (4 ft)
Armament: one 105-mm (4.13-in) howitzer and one 12.7-mm (0.5-in) machine-gun

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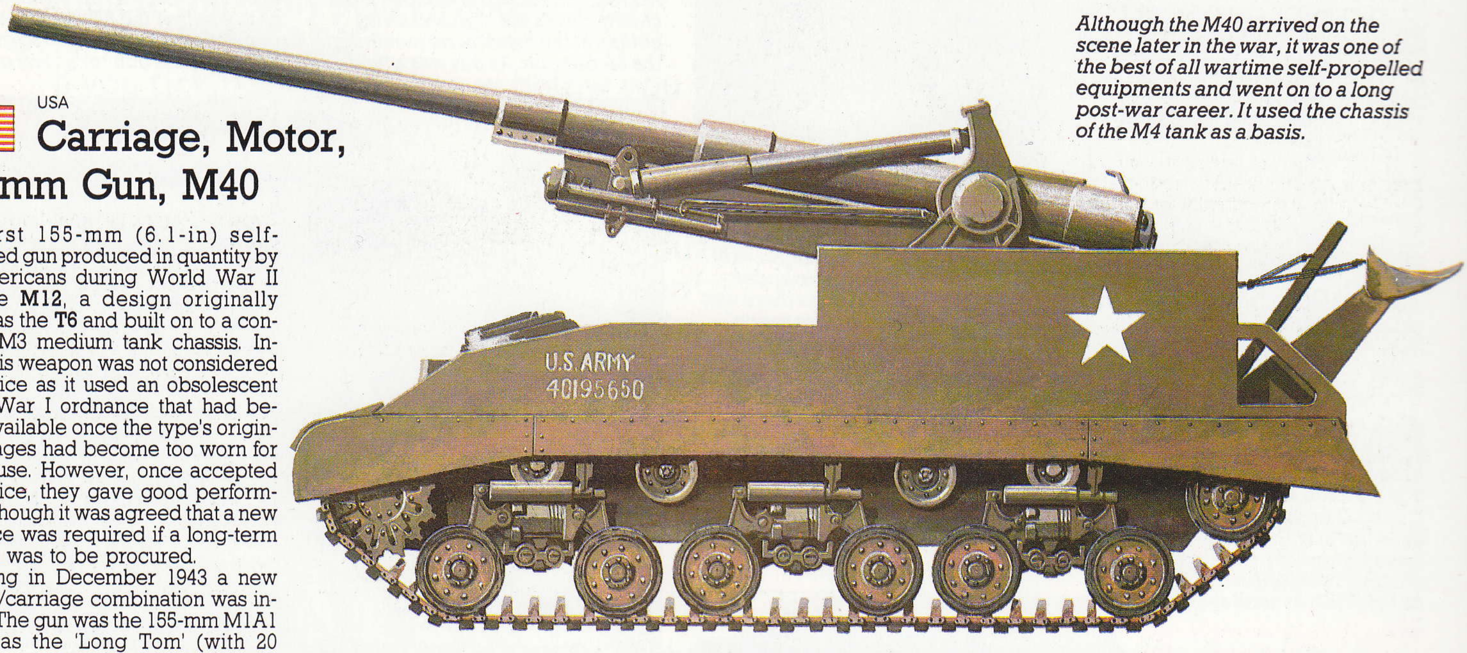
USA

Carriage, Motor, 155-mm Gun, M40



Although the M40 arrived on the scene later in the war, it was one of the best of all wartime self-propelled equipments and went on to a long post-war career. It used the chassis of the M4 tank as a basis.

The first 155-mm (6.1-in) self-propelled gun produced in quantity by the Americans during World War II was the **M12**, a design originally known as the **T6** and built on to a converted M3 medium tank chassis. Initially this weapon was not considered for service as it used an obsolescent World War I ordnance that had become available once the type's original carriages had become too worn for further use. However, once accepted for service, they gave good performance although it was agreed that a new ordnance was required if a long-term weapon was to be procured.

Starting in December 1943 a new weapon/carriage combination was initiated. The gun was the 155-mm M1A1 known as the 'Long Tom' (with 20 rounds) and the carriage was based on the chassis of the M4A3 medium tank, though much widened and fitted with the latest high volute suspension springing. The engine was moved from the rear to a new forward position, and to absorb some of the recoil forces a spade was added to the rear; this latter could be raised for travelling. A working platform under the breech was also provided. The gun had a range of 23514 m (25,715 yards) and fired a projectile weighing 43.1 kg (95 lb), which made it a very useful counterbattery and long-range bombardment weapon. Maximum armour thickness was 12.7 mm (0.5 in)

The development of this **Carriage, Motor, 155-mm Gun, M40** took rather longer than expected, so it was not until January 1945 that the first production examples rolled off the lines. They were rushed across the Atlantic in time to see the end of the war in Germany. M40s took part in the bombardment of Köln and the short campaigning after this. Between January and May 1945 no less than 311 M40s were built, and production continued after the war. The M40 was to see its most concerted use during the Korean conflict, where it proved to be an excellent weapon/carriage combination.

On the M40 there was no protection for the crew as the type was designed for use so far behind the front line that none would be necessary. The M40 had a crew of eight, and there was provision on the carriage for their weapons and kit. The same carriage was also used to mount a 203-mm (8-in) howitzer, but this version (the **Carriage, Motor, 8-in Howitzer, M43**), was not used in great numbers; only 48 were built.

After 1945 M40s were distributed to many other armies. The British Army accepted a number and used them for some years. More were used by nations such as France, with whom the type saw extensive service in Indo-China.

There was one variant of the M40, the **T30 Cargo Carrier**. As its designation implies, it could be used as a general supply carrier though its normal deployment was for the ammunition supply of M40 batteries. Not many were built as most of the manufacturing potential was concentrated on producing gun carriers.

One of the main claims to importance of the M40 was that it paved the way for the current generation of self-propelled weapons. It was produced at a time when nuclear warfare was just making its debut, and the need for protection against this new battle hazard was particularly noticeable on the M40 with its open fighting platform. The type was therefore used extensively for trials and experiments designed to provide protection for the crew. The M40 proved beyond doubt that the only proper protection comes from an armoured turret, and most modern self-propelled weapons now use such an arrangement.

Specification
M40

Type: self-propelled gun
Crew: 8
Weight: 37195 kg (82,000 lb)
Powerplant: one Continental 9-cylinder radial piston engine developing 294.6 kW (395 hp)
Dimensions: length overall 9.04 m (29 ft 8 in) and hull only 6.65 m (21 ft 10 in); width 3.15 m (10 ft 4 in); height 2.84 m (9 ft 4 in)
Performance: maximum speed 38.6 km/h (24 mph); range 161 km (100 miles); fording 1.067 m (3 ft 6 in)
Armament: one 155-mm (6.1-in) gun

UK

Bishop

The vehicle that became known as the **Bishop** was conceived at a time when 25-pdr batteries in the North African desert were perforce used as anti-tank weapons and were taking a terrible pounding as a result. It was decided to place the 25-pdr on a mobile carriage to increase protection for the gun crews, and it was soon clear that the Valentine infantry tank would make a good basis for such a conversion. Unfortunately the exact role of this gun/tank combination was uncertain from the start. The tank exponents saw it as a variant of the heavy-gun tank theme, while the gunners wanted a self-propelled carriage. These arguments were never really solved, and the result was something of a compromise even though the gunners won in the end.

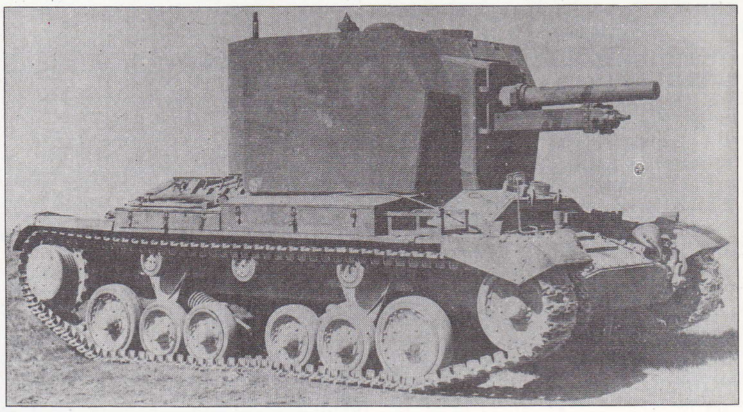
The Valentine 25-pdr emerged as a straightforward conversion (officially the **Mounting, Valentine, 25-pdr Gun Mk I on Carrier, Valentine, 25-pdr Gun, Mk I**) the usual turret being replaced by a much larger turret mounting the 25-pdr. This new turret was fixed, and was a large slab-sided design too large for battlefield concealment and too small to allow much room inside for the gun crew. The turret design also had one major disadvantage for the gunners in that it restricted the elevation of the barrel and thus curtailed range to only 5852 (6,400 yards) which was a considerable reduction from the normal 12253 m (13,400 yards). The only way to increase this performance was the tedious and tactically-hampering construction of earth ramps up which the vehicle could be driven to increase the elevation angle. Traverse was also severely restricted, to a maximum of 4° to each side. Internal ammunition stowage was 32 rounds but more could be carried in a limber towed behind the vehicle. Armour varied in thickness from 8 mm (0.315 in) to 60 mm (2.36 in).

The 25-pdr Valentine went into action in North Africa during the latter stages of the campaign in that theatre, by which time the 25-pdr was no longer in use as an anti-tank gun, so the vehicles were used as self-propelled artillery with no distraction and the Royal Artillery learned a lot from their use. The type was eventually named Bishop, and it went on to be used in Sicily and Italy during the opening stages of that campaign. Throughout these campaigns the Bishop demonstrated all its several drawbacks, but also provided an indication of the potential of self-propelled artillery for it was the first British self-propelled weapon to see active service. The need for supporting logistics was more than emphasized, as was the need for improved radio links with forward observers.

The Bishop also demonstrated things to avoid in future designs. The most obvious one was for the gun to have its full range of movement if it was to be of any use; additionally, more room was needed to serve the gun, for the turret of the Bishop was cramped and ill-ventilated. More internal ammunition stowage was needed and the carrier had to be fast enough to keep up with tanks. Being an infantry tank, the Valentine chassis was too slow to keep up with the armoured formations.

All these things were put right when the gunners were issued numbers of M7 Priests. The gunners took to the Priest with a will, and before long the Bishops had been discarded. They may have been less than perfect, but they taught the gunners a lot and the Bishop has the distinction of being the British Army's first self-propelled artillery piece.

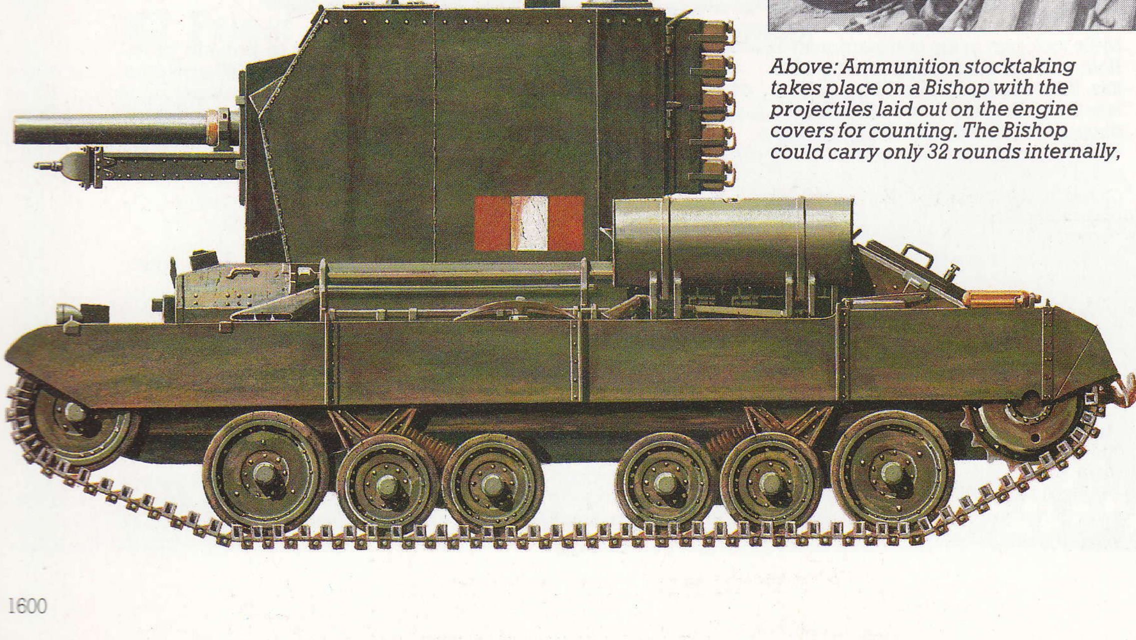
Above: A Bishop on the ranges with the gun detachment commander outside the fixed turret, as there was room for only two gunners inside. The fixed turret restricted the barrel elevation and thus range.



Above: This Bishop in 'factory' state clearly shows the high and bulky outline of the fixed turret mounting the 25-pdr gun. As this was a 'first attempt' design there was confusion as to whether the Bishop was a heavy gun tank or a self-propelled gun, but in the end the gunner's view prevailed.

Above: Ammunition stocktaking takes place on a Bishop with the projectiles laid out on the engine covers for counting. The Bishop could carry only 32 rounds internally, as space inside the fixed turret was cramped. The projectiles are 25-pdr HE shells, the normal round fired, although smoke could also be carried.

Below: The Bishop was an early British attempt to produce self-propelled artillery by placing a 25-pdr gun onto a Valentine tank chassis. The gun was mounted in a fixed turret with only limited elevation and the result was not a success, being replaced in service by the Priest as soon as possible.



Specification
Bishop
Type: self-propelled gun-howitzer
Crew: 4
Weight: 7911 kg (17,440 lb)
Powerplant: one AEC 6-cylinder diesel developing 97.7 kW (131 hp)
Dimensions: length 5.64 m (18 ft 6 in) width 2.77 m (9 ft 1 in); height 3.05 m (10 ft)
Performance: maximum road speed 24 km/h (15 mph); road range 177 km (110 miles); fording 0.91 m (3 ft)
Armament: one 25-pdr (87.6-mm/3.45-in) gun-howitzer